AVIATION WEEK

A McGRAW-HILL PUBLICATION

APRIL 17, 1950

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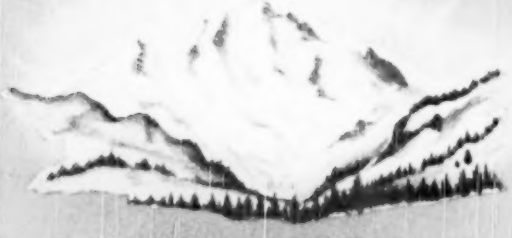
The severe test of service in the arctic or the tropics offers an impressive demonstration of the exceptional reliability of BG platinum electrode Spark Plugs. Since they perform so efficiently under extreme conditions, it is logical to use BG Spark Plugs in any type of service—in any part of the world—and assure an extra margin of reliability.



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NEW CONTINUOUS AIRCRAFT FIRE DETECTOR

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The new *Kidde* Aircraft Fire Detector, now in the approval stage, is made from a continuous fire sensing element which has no moving parts. Made to fit easily around nacelles and other danger spots, it will repeat fire signals without resetting—can be set to give warning when predetermined temperatures are exceeded. Fire-resistant, it is unaffected by fungus, moisture, salt or other agents which might cause malfunction.

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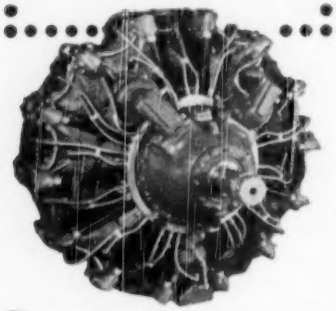

During the war, TITEFLEX made ignition shielding for practically every type of reciprocating engine used on military and civilian aircraft. Today there is scarcely an airline in the United States and Canada that does not use TITEFLEX ignition shielding on at least a part of their equipment.

What this means to you is that you can replace or repair ignition shielding on your engines, without fuss or delay, simply by calling on TITEFLEX. We have supplied so many engines with shielding in the form of original equipment that we are organized to give you immediate service on your maintenance requirements. Whether you need complete assemblies or component parts—call on TITEFLEX for experienced help.

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Aviation Week

Volume 52 April 17, 1950 Number 16

Headline News

Maintenance Bigwigs at ATA Meeting ..11
Simplicity and Ruggedness Wanted ..12
More Powerful Stratojet B-47C ..16

Production

USAF Bid Information ..18

Aeronautical Engineering

P&W Combats Engine Test Noise ..19
Pilots' Idea of Short-Haul Plane ..22
Plastics Studied for Rain Effect ..24
High Performance Wing Tested ..28

Financial

Transcontinental Lines Come Back ..36

Aviation Sales & Service

Cloud Seeding Pays Off in West ..39

New Aviation Products

Automatic Cabin Pressure Control ..43

Air Transport

'Slow' Helicopters Save Time ..47
CAB Straddles 500 kc. Issue ..48
Profits Up ..50

Editorial

Truman, Finletter and Air Power ..58

Departments

Who's Where ..7
Industry Observer ..7
Aviation Calendar ..8
News Digest ..9
Briefing for Dealers ..39
Shortlines ..53
CAB Schedule ..54
What's New ..56

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Executive and Editorial Offices: 330 West 42nd St., New York 18, N. Y., Phone Longacre 4-3035; National Press Bldg., Washington 4, D. C., Phone National 3414.

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WHO'S WHERE

In the Front Office

Donald M. Parker has been named contracts manager for Piasecki Helicopter Corp. He has been connected with aviation for more than 20 years, including service with Pacific Alaska Airways, Wright Aeronautical, Republic Aviation, and PAA. His latest position was as general sales manager for Piper Aircraft.

W. R. Miller is now executive asst. to vp and general manager of Pacific Airmotive Corp. and will work with the company's Burbank, Oakland, Kansas City, Linden and Anchorage divisions. He was formerly general supervisor of the industrial engineering dept. and more recently on the staff of vp for Convair at San Diego.

Rodney W. King has been appointed Eastern Air Lines' general traffic manager succeeding **R. L. Turner,** who is leaving the airline. King's asst. will be **Frank Sharpe.** King had previously been with American Airlines since 1934 serving in Washington, Chicago and New York. In the latter city he was in charge of AA's domestic and overseas reservations and ticket counter system. Sharpe had been with AA since 1941 and had been responsible for company's principal reservations offices.

Capt. Lewis W. Dymond has been named operations manager for National Airlines. He joined the airline in 1938 as an aircraft cleaner and apprentice mechanic, rising to asst. operations manager, the position held prior to his new promotion. He also holds an airline pilot's rating.

Kenneth V. Brugh, Jr., has been made vp. of Hawthorne Flying Service, and **Ralph Crocker,** vp. and manager of the company's Greensboro-High Point base, has been named to the board. Brugh has been manager of the Jacksonville, Fla., base since 1946, being in charge of Royal Pakistan Air Force training during 1949.

Changes

Robert A. Wells has been made chief fuels and lubricants engineer, aviation section, product development and product engineering of Gulf Oil Corp. . . . **Ralph L. Davies,** former field engineer for Wright Aeronautical has been made company's sales engineering rep at Dayton, Ohio . . . **John E. Basanese** has been appointed to sales staff of General Aircraft Supply Corp., Detroit.

Honors and Elections

John A. Smith, cargo sales manager for Continental Air Lines, has been elected chairman of policy committee of air express division of Air Transport Assn., and **Russell LeBrock,** United Air Lines' mail and express supt., has been made chairman of ATA's operating practices committee of air express division.

INDUSTRY OBSERVER

► Air Force is changing the designation of an interceptor version of the Lockheed F-94B to F-97, and Pentagon sources say it will be something to watch in forthcoming fighter contracts. F-97 is powered with the Pratt & Whitney J-48 turbojet rated at around 8000 thrust lb. with afterburner, and has a very thin, straight wing, which gives it performance right up to the edge of Mach 1, if not beyond it. Thus the basic Lockheed F-80 is getting yet another lease on life.

► **Competition was hot last week for the pressurization contracts for the 65 Martin 4-0-4 transports which are under order by TWA and Eastern Airlines. Engineering decision was expected at the weekend with three competitors—the Fairchild Stratos system, AiResearch, and Hamilton Standard division of United Aircraft Corp.—all trying for the business.**

► Seattle pressure on the USAF to keep military contracts in the Boeing plant there may result in a revision of the C-97 military transport contracts, now scheduled to end this fall. A recent West Coast trip by Brig. Gen. Horace Shephard to study the Seattle situation reportedly has resulted in a Pentagon report that with contract for 67 additional Stratofreighters Boeing could keep the Seattle plant going at a 10,000-employee level through 1951.

► **New designations for aircraft fuels include the following changes: Spec. No. AN-F-58A (Grade JP-3) is now MIL-F-5624; AN-F-32A(JP-1) becomes MIL-F-5616; AN-F-48B (reciprocating engine fuel covering octane ratings of 80, 91/98, 100/130 and 115/145) is now MIL-F-5572. New reference fuel for jets, MIL-5161(USAF) differs from JP-3 in that its distillation range is closely defined and specifications for other properties, such as aromatic and sulphur content and vapor pressure, are given minimum as well as maximum values. Hydraulic fluid AN-O-366 has been re-labeled MIL-O-5606.**

► Purchase of two twin-engine Percival Prince feederliner type planes by Shell Oil may be the forerunner of additional sales in this country.

► **Reports that the Taylor Aerocar prototype roadable plane had been sold to Goodrich, although widely circulated on the west coast, has been denied by Moulton B. Taylor, designer of the roadable.**

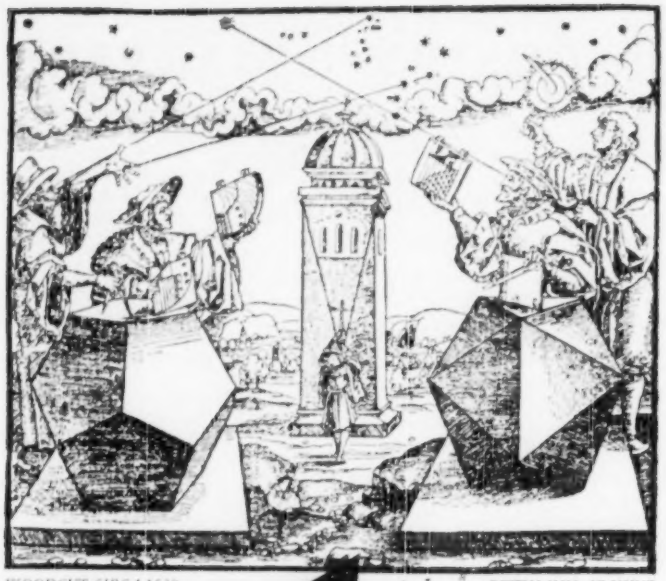
► Switching from Ft. Worth to San Diego of the project to install four jet engines in pods near wingtips on each of Convair's B-36 intercontinental bombers, has provided the San Diego plant with sizeable increase in employment, with approximately 4300 workers needed on the pod installation projects.

► **Bell Aircraft Corp. has organized the Erie Insurance Co. to handle helicopter hull insurance and re-insurance and other associated aircraft insurance and re-insurance.**

► French sources say the Leduc 010 piggy back ramjet experimental plane is being followed by another Leduc model with pressure cabin, which is expected to attain the phenomenal climbing speed of more than 20,000 ft./min. as compared to 8000 ft./min. already attained by the 010.

► **French designers claim advantages over pulsejet and ramjet powered helicopters in the Ariel II (SO 1110) experimental helicopter which compresses air in the fuselage, pipes it out to tiny stream-lined combustion chambers in the rotor tips, where it is fired to produce a reaction thrust from nozzles on the combustion chambers. Drag of the combustion chambers is reported considerably less than that of the ramjets and pulsejets similarly installed at blade tips of American experimental craft.**

► Goodyear's biggest blimp yet, the 324-ft. long "N" ship, now in construction in the old dirigible dock at Akron, is expected to be completed around the end of September. Contract price for the big anti-submarine craft is reported at $3,328,000.



WOODCUT CIRCA 1530 — BETTMANN ARCHIVE

Written in the stars

For centuries, man has looked to the universal constants, the stars, to establish his location on the earth's surface. The advent of modern, high-speed aircraft, however, raised a new problem in celestial navigation — that of plotting, instantly and accurately, the position of a rapidly moving object. Time-honored nautical methods proved inadequate.

The recently developed Kollsman Periscopic Sextant, with special automatic averager, enables the airborne navigator of high-speed craft to obtain a series of extremely accurate sights. It also eliminates the need for an astrodome.

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AVIATION CALENDAR

Apr. 17-20—1950 national aeronautic meeting, Society of Automotive Engineers, Hotel Statler, New York, N. Y.

April 18—Meeting begins of facilitation subcommittee of International Air Transport Assn., Heliopolis Palace Hotel, Cairo, Egypt.

Apr. 27-28—Air traffic conference, sponsored by Air Traffic Conference of Air Transport Assn., Saxony Hotel, Miami Beach, Fla.

Apr. 29-30—Fifth annual southeastern air show and exposition, Jacksonville, Fla.

May 3-4—15th National Aircraft Standards Committee national meeting, Aircraft Industries Assn. offices, Hollywood-Roosevelt Hotel, Los Angeles, Calif.

May 12-13—Midwestern conference on fluid dynamics and meeting of American Physical Society (fluid dynamics div.) in conjunction with dedication of new mechanical engineering building, University of Illinois, Urbana.

May 18-19—Annual meeting and third national forum of Corporation Aircraft Owners Assn., Hotel Statler, Washington, D. C.

May 19-20—Seventh annual personal aircraft meeting, sponsored by Institute of Aeronautical Sciences, Lassen Hotel, Wichita, Kans.

May 23—National meeting of AIA Airplane Technical Committee, Carlton Hotel, Washington, D. C.

May 24-26—Technical conference on telemetering, sponsored by American Institute of Electrical Engineers and National Telemetering Forum, Benjamin Franklin Hotel, Philadelphia, Penn.

May 25-26—Aircraft Industries Assn. board of governors meeting, Williamsburg, Va.

May 25-27—Spring meeting, Society for Experimental Stress Analysis, Hotel Statler, Cleveland.

May 27—Annual spring air regatta, Philadelphia Aviation Club, Wings Field, Ambler, Penn. (May 28 is alternate date in event of bad weather.)

May 27-30—Wright Memorial Glider Meet, South Dayton Airport, Dayton.

June 1-4—Aviation Writers Assn. annual convention, Hotel Mount Royal, Montreal, Canada.

June 8—Pratt & Whitney distributor operation and maintenance meeting, Airwork Corp., Millville, N. J.

June 10-13—National Aeronautics Assn., annual convention, Hotel Statler, St. Louis, Mo.

June 10-25—International aero exhibition, Centenary Palace, Brussels, Belgium.

July 7-8—Royal Air Force 1950 display, Farnborough airfield, England.

July 12-14—Annual summer meeting of Institute of Aeronautical Sciences, IAS western headquarters bldg., Los Angeles, Calif.

Sept. 5-10—Eleventh flying display and exhibition, Society of British Aircraft Constructors, Farnborough airfield, England.

Oct. 16-20—1950 annual general meeting of the International Air Transport Assn., Fairmont Hotel, San Francisco.

PICTURE CREDITS

16—Convair; 19—P&W; 20—Airline Pilot; 28—McGraw-Hill World News.

NEWS DIGEST

DOMESTIC

Merger agreement by which Southwest Airways Co. would take over routes and assets of West Coast Airlines has been presented to Civil Aeronautics Board for approval. The deal calls for operation of the combined feeder system by and in the name of Southwest Airways. A CAB examiner recently recommended extension of SWA certificate until Sept. 30, 1954, and the Board has been holding hearings on WCA's certificate extension bid. CAB has urged feeders and other carriers to work out mergers that would be in the public interest.

Martin JRM-2 Marshall Mars burned out following emergency landing after engine caught fire during test hop near Oahu, Hawaii. There were no casualties among the seven-man crew, but the huge transport was totally destroyed with loss estimated at $5 million. The plane had 8262 operational hr. as of Jan. 1, but had had a major overhaul at 5000 hr. Three sister ships to the Marshall Mars, all designated JRM-1 and equipped with Wright R-3350 engines, and a fourth similar flying boat, the Caroline Mars JRM-2, equipped with Pratt & Whitney R-4360 engines, remain in Navy service.

Vice Admiral Thomas T. Craven, a guiding light in establishment of the Navy Bureau of Aeronautics, died at St. Albans Naval Hospital. He was 76 years old. Admiral Craven is credited with ordering conversion of the collier Jupiter into America's first aircraft carrier, the Langley.

Left wing United Electrical, Radio and Machine Workers Union was ousted as collective bargaining agent at Sperry Gyroscope Co., Lake Success, L. I., by newly organized International Union of Electrical, Radio and Machine Workers of America. The older union had been expelled from CIO.

Senate confirmed appointments of W. Stuart Symington, formerly Secretary of Air Force, as chairman of the National Security Resources Board; and Frank Pace, Jr., Budget Director, as Secretary of Army.

American Airlines inaugurated scheduled transcontinental DC-6 air coach service Apr. 9 with approximately 4½-cents-a-mile fares. First westbound flight out of New York had 69 of the 70 seats occupied, while the initial eastbound flight from Los Angeles carried 65. The trips are made in daylight with one stop at Chicago. AA spokesman said advance bookings are "heavy."

Navy awarded contracts totaling $359,421 to three concerns for the manufacture of Naval air "government furnished equipment." Recipients are: Lynch Bros., Inc., Pine Meadow, Conn., $122,400 for 10,000 Mk. 65 Model O 500-lb. practice bombs; Sperry Corp., Great Neck, L. I., N. Y., $81,256 for 8 automatic pilots; Bendix Aviation Corp., Baltimore (Towson), Md., $155,765 for 8352 radiosonde transmitters.

Army granted a $524,140 contract to A. W. Kutsche & Co., Detroit, Mich., for building construction at Selfridge AFB, Mich.

Temporary elimination of U. S. "transit visa" requirements is estimated to have benefited over 1000 international air travelers from foreign countries in continuous transit through this country during the past four months. Previously, an alien passenger planning to stop at any point in the U. S. while en route on an international airline, had to appear personally before an American consul to obtain a transit visa. Arrangement is said to have saved substantial passenger business for U. S. flag carriers that might otherwise have gone to foreign airlines not stopping in the U. S.

FINANCIAL

Lear, Inc., gives net profit for past year as of Dec. 31 as $510,496 on sales of $7,368,000, compared with 1948 operating loss of $702,551 on sales of $5,326,000. Unfilled order backlog at the year-end, largest since the war, is reported as $7,200,000, compared with $4,269,000 for 1948. Current assets are $3,320,404.91 and current liabilities $807,714.58.

Electric Boat Co. had 1949 sales of $45,234,961 compared with $54,558,099 for the previous year. Backlog at beginning of 1950 was $45,780,000 which includes orders for 100 F-86A Sabre fighters for Royal Canadian Air Force. Sales during last year included completion and delivery of 26 four-engine Canadair Four transports to British Overseas Airways Corp. and Canadian Pacific Air Lines by the company's subsidiary, Canadair, Ltd.

Fairchild Camera & Instrument Corp. reports profit of $270,297 for year ending Dec. 31, 1949, after provisions for taxes and deduction for minority interests, on sales of $7,704,022.

INTERNATIONAL

Royal Canadian Air Force received $190 million appropriation for fiscal 1950-51—40 percent of the Dominion's total defense budget. This compares with $138,500,000 spent in 1949-50 fiscal year and $90,200,000 for fiscal 1948-49.

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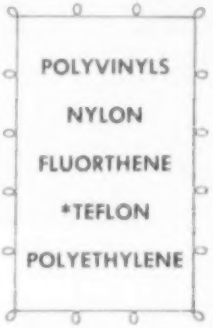

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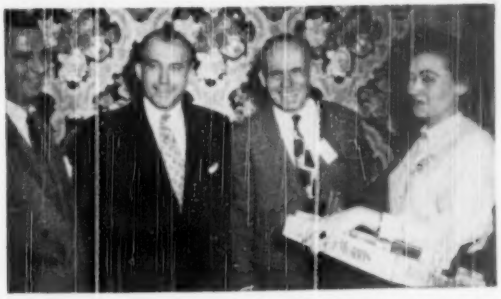
With Maintenance Bigwigs at ATA Conference



Stan Shatto (Western), Ray Dunn (TWA) and ATA's Engineering and Maintenance Conference Secretary, Al W. Dallas, buy smokes.

A. T. Notley, Henry Weeks and Al Vollmecke (all of CAA), Hugh Freeman (CAB) and Steve Rolle (CAA) talk shop after a session.

Ray Dunn (TWA), Wayne Parrish (American Aviation), Robert Fulton (EAL) and Lt. Col. Robert White (USAF) at main dinner.

CAA's Vollmecke; Wing Comdr. W. P. Gouin (RCAF); Shatto; H. W. Koontz (Convair), speaker; Emcee Aubrey Keif.

Lewis Rodert (NACA), Al Dallas (ATA), Lt. Col. R. Mogford (MATS), A. T. Notley (CAA), Lt. Col. M. C. Brennan (USAF) were among 400 at banquet.

Top: CAA's Weeks, Rolle. Seated: CAB's Freeman, Lt. Cmdr. N. S. Weary (BuAer).

Braniff's W. V. Simonsen gets even with CAB's Kenneth Sonner for bad joke; Bill Birren, Grand Central Airport, is the witness.

Ralph Geror (NWA), R. L. Anderson (C&S), Charles Dolson Delta) and G. J. Dye (Delta) gathersat party given by Texaco.

Vol. 52, No. 16

AVIATION WEEK

April 17, 1950

Conference session chairmen at ATA meet included W. W. Davies (United), heating, ventilating and pressurization; R. E. Geror (NWA), engines; H. W. Holzapfel (Western), structures and controls, and J. G. Borger (Pan American), electrical systems.

Others among the leaders of the various groups were G. C. Younie, (Braniff), fuel and oil systems; F. A. Humphrey (TWA), hydraulic and vacuum systems; R. L. Anderson (Chicago & Southern), ignition systems, and Robert Stark (Eastern), propellers.

Airlines Want Simplicity and Ruggedness

Engineers at ATA meeting decide those two factors hold key to cutting costs.

New simplicity of design and ruggedness in operation of civil transports, their control systems and components were the two underlying themes of the recent 1950 Air Transport Assn. annual Engineering and Maintenance Conference at Kansas City.

These emerged from three days of discussion by top-flight airline maintenance men and airframe engineering personnel as the two most important factors in reduction of maintenance costs and increase in performance dependability.

The increasing stress on these engineering problems was apparent in the record-high attendance of 575, including more than 135 representatives from 24 U.S. scheduled carriers and 18 from ten foreign airlines.

▶ **Other Delegates**—Also present in larger numbers than before were participants from government and military agencies, airframe, engine and propeller manufacturers, and producers of aircraft accessories and equipment.

Procedure of the 1950 meeting followed the successful pattern established in 1949. The 650 questions originally submitted to ATA by the airlines for conference discussion were condensed to 465 and grouped into ten general subjects.

Manufacturers' spokesmen generally exhibited a willingness to study any valid suggestion, but in some cases indicated that certain requests were excessive or required unreasonably large expenditures to fill the demands.

▶ **For Example**—Specifically, propeller manufacturers indicated they could not produce a stronger unit without exposing themselves to criticism from the airlines for making too heavy a product.

Similarly, vacuum tube manufacturers contended they were forced to proceed with caution towards production of the "ruggedized" tubes demanded by the airline industry because of abnormally high cost of development and unavoidable rate of rejection—sometimes as high as 60 percent—of newly manufactured units.

Scope of the discussions was apparent in the ten subject groupings. Topics included ground servicing and shop equipment maintenance; fuel and oil systems; instruments; propellers; electrical systems; engines; structures and controls; hydraulic and vacuum systems; heating, ventilating and pressurization, and ignition.

On-the-spot observers could reach these conclusions among others, in those respective categories:

• **Underground ramp servicing equipment** is proving easier and less expensive to maintain than conventional mobile equipment.

• **Integral fuel tank sealing** is not the problem it used to be and the newer bladder-type fuel cells are proving effective.

• **Electrically driven gyro instruments** are being more widely accepted than heretofore.

• **Increased propeller weight** appears the most effective way to reduce blade and hub failures and cope with hitherto undetermined vibration problems.

• **Electrical installation** standardization has been agreed on by airframe manufacturers through the Aircraft Industries Assn., in the first such agreement in the history of aircraft manufacturing. New emphasis is being placed on design criteria for electrical systems as they are called on to perform greater and more exacting functions.

• **Two major engine problems**—lead fouling of spark plugs and oil sludging—are nearing solution.

• **In aircraft structure maintenance,** larger airlines have determined that "progressive overhaul" provides the effective means of maintaining a uniform fleet.

• **Nonflammable hydraulic fluid** development and its impact on increased safety commanded the attention of all airlines.

• **Distribution of cabin air** to provide maximum comfort to crew and passengers is a continuing problem in large modern transports.

• **Ignition trouble-shooting** and costs can be materially reduced through the use of airborne ignition analyzers.

Except for the session on ground servicing and shop equipment and that

Phil Doran (Pratt & Whitney Aircraft), Reagan Stunkel (Hydro Aire), Aubrey Keif (Texas Co.), Kenneth J. Boedecker (Wright Aeronautical).

on propellers, each of which ran three hours, topics received six hours of discussion. Three simultaneous sessions were held on each of the three days of the conference, Apr. 4, 5 and 6.

Stanley R. Shatto, vice-president-maintenance and engineering at Western Airlines, was elected chairman of the 1951 meeting, which will be held in Chicago.

Ground Servicing and Shop Equipment Maintenance

Methods for maintaining ground equipment vary considerably among the various airlines.

Some, such as Trans-Canada Air Lines, have put out a ground equipment manual which sets up the standard for line stations.

Others, like Northwest and Braniff, send out traveling mechanics at regular intervals to maintain ground equipment. Many companies such as Pan American use facilities of local concerns to keep standard station equipment in repair, while specialized units are overhauled in their own shops.

It was generally agreed that centralized control of shop equipment maintenance at large stations is more economical than maintenance by operating crews during normal work load periods, since it permits greater continuity of work. Pan Am upheld preventive maintenance for shop tools, indicating that, in its experience, tools were kept in better condition and equipment replacement was substantially reduced.

▶ **Accidents**—On reduction of losses due to industrial accidents and excessive maintenance:

• **Shell Oil Co.** estimated that 25 percent of all maintenance costs were directly attributable to improper operation and negligence.

• **United Air Lines** has determined that the majority of its accidents occur during the "graveyard" shift.

• **American Airlines** noted that when supervisory employes operated equipment, maintenance costs dropped noticeably.

• **Most important single factor** in reduction of maintenance costs and equipment accidents is the establishment of a comprehensive course of instruction for all operators of mechanical equipment.

▶ **Underground Facilities**—Underground ramp servicing facilities received vigorous discussion. Most of the airlines believed that such facilities were more practical and definitely more economical than above-ground, mobile equipment.

NWA, which has studied the problem extensively stated that, although 100 percent reliability has not yet been obtained from underground motor-generators, definite economies have been realized over their use in the conventional mobile fashion.

Underground fueling pits, NWA said, are considerably easier and less expensive to maintain than fuel trucks. A Gulf Oil Co. representative pointed out that pit equipment could be depreciated over twice the period of tender equipment charge-off. EAL felt that the cost of fuel pits was considerably less than that of fuel trucks.

United Air Lines, however, pointed out some of the disadvantages of underground ramp servicing facilities: sand and water accumulate in the pits, drainage is difficult under severe precipitation conditions, units tend to become inoperative through winter freezing, and the pits, as a whole, are difficult to maintain. UAL considers that, for the present, pits are impractical.

▶ **Ice Removal**—Ice prevention and/or removal from aircraft were discussed by several airline engineers. Some preferred a 3:2 solution of propylene glycol and water sprayed on the wing and empennage surfaces. Although this method is reasonably effective, they said, it is expensive, and has the disadvantage of making the surfaces very slippery and hazardous to mechanics and fueling personnel. Braniff said it uses alcohol with excellent results.

TCA loosens ice with alcohol, then removes it with a stick shod with a piece of rubber hose. An alcohol swab will remove rime ice without difficulty, but is ineffective against glaze.

Little regard was given to the accumulation of potentially inflammable fluids in numerous wing and empennage cavities and the consequent fire hazard. Representatives agreed with a suggestion from the floor that this matter required careful attention.

TCA has found that a light coating of oil is beneficial in preventing ice from forming on the external servicing fittings of aircraft. PAA is satisfied with a solution of ethylene glycol and water, used in conjunction with wing covers.

The RCAF stated it found nylon the most suitable material for the covers since it resisted deterioration well, was light, easy to handle and could be stowed in a small space.

▶ **Ground Cooling**—TCA gave the following specifications on a freon-type ground air conditioner which they have recently put into service on their DC-4Ms with considerable success: it produces 18 tons of refrigeration at 2400 cfm. with a pressure of 10 in. of water at the end of the duct. The unit costs $12,500 Canadian, weighs 6000 lb., and measures 5 x 6 x 12 ft. The maintenance costs were said to be extremely low.

United Air Lines reported success in its experiments with painting the upper portions of the fuselage white in order to reduce interior cabin temperatures.

Fuel and Oil Systems

Sealing integral fuel tanks on more modern aircraft such as the Constellation 749, Convair 240 and DC-6 has not presented any serious problems. But sealing worries on DC-4s and Model 049 Connies, discussed at last year's meeting, still are being studied by the airlines.

Major decision, not yet finalized by the industry, is whether to patch fuel tanks when necessary, or to strip and reseal them when leakage becomes excessive. The latter process is so expensive that patching probably will be the decision in most cases.

For example, one airline estimates the cost of stripping and re-sealing the tanks of a DC-4 as follows:

• **Equipment to perform the job**—$7-10,000.

• **Labor and material**—$10-14,000.

Total is approximately $24,000, not counting cost of immobilizing the aircraft. It was also brought out that an added cost was the necessity of accomplishing all structural repairs to the tanks prior to re-sealing. In the last analysis, it was felt that if the tanks were structurally solid, chemically clean, and this sealing were well done,

a stripping job could be worth while due to the reduced subsequent maintenance.

► **Materials**—Most airlines are reluctant to use any of the newer tank sealing materials. This has given a definite edge to existing products. One of the most commonly used is Minnesota Mining Compound EC 801-807, its main disadvantage being that it is difficult to apply correctly.

It was pointed out that a translucent or transparent compound would provide the definite advantage of allowing the mechanic applying the material to see any air bubbles or other defects as he went along, and correct them on the spot. Unfortunately, carbon black provides the best rubber bond known, which makes the development of a good transparent product difficult.

► **Connie Oil Tank**—One of the first points brought up during the discussion of oil systems, was the oil tank installation on the Lockheed Constellation. Originally, the Constellation was equipped with a bare aluminum oil tank.

Lockheed has issued a service bulletin describing how operators could have a fire-resistant wrapping installed on tanks. While the material provided excellent fire-proofing qualities, operators expressed the fear that the covering would make the detection of cracks and leaks extremely difficult. To this, Lockheed replied that the covering damped vibration sufficiently to preclude the tank's cracking under normal use.

A second objection was the apparent necessity of removing the covering at intervals in order to inspect for corrosion. If the material were replaced after each removal this method of fire-proofing eventually would become extremely expensive.

The Lockheed representative stated that his company had recently found it desirable to design a new oil tank allowing for greater expansion space, and contemplates manufacturing the new tank out of stainless steel, which would solve future fire-proofing problems.

Propellers

Basically the propeller conference revolved around the relative advantages of the steel or aluminum blade.

Many improvements have been made in both types, yet neither has been perfected. One of the principal problems with the Hamilton Standard unit has been delamination. To correct this, the voids created can be injected as many times as necessary, provided the balance of the propeller is not destroyed. Furthermore, delamination is only critical in the outer 36 in. of the blade, and is not critical on the 2H17 blade.

Discussions of the Curtiss-Electric propellers brought out the fact that as the weight of the unit increases, the trouble diminishes. But obviously there is a limit to this method of reducing propeller problems.

► **Maintenance**—Discussion of propeller-balancing equipment revealed that most maintenance people preferred the Sutton or Micro Poise horizontal balancers to the conventional vertical equipment. Among the advantages cited:

- **Less damage** to the knife edge.
- **Reduction in handling** of the propeller.
- **Extreme accuracy.**

The Metallizing Corp. of America has developed a method of applying a protective zinc coating to the leading edges of propellers. Airlines who had used it commented favorably.

Structures and Controls

75ST aluminum has given better results than expected, both from the point of view of structural endurance and resistance to corrosion. The principal problems encountered with this alloy have been hand-dimpling, drilling and forming heavy gage sheets without heated tools.

These difficulties are particularly evident when repairs have to be made in the field.

For this reason it is common practice to substitute one gage heavier 24ST when local repairs are made. American replaces any 24ST repairs with 75ST at the next major overhaul while PAA considers all 24ST repairs as permanent, provided they are not too extensive. It was generally agreed that the increase in weight from substituting 24ST for 75ST was insignificant.

► **Door Precaution**—Continental Airlines' solution to the possibility of the Metropolitan Air Parts Air Stair Door opening in flight is to fasten it with a chain. This chain is attached after takeoff and removed before landing. Should the door become unlatched inadvertently in flight, the chain allows it to open some six inches.

WAL has had excellent results from operating the door hydraulically, although continuously opening and closing the door during the winter requires considerable hand pumping by a crew member to supply pressure for the door's operation.

► **Corrosion Problems**—To treat corrosion in difficult-to-reach areas, it is first necessary to make the structure accessible for a thorough mechanical cleaning. One operator suggested that an effective procedure was to treat the surface with sodium dichromate followed by one or more coats of zinc chromate.

Clear Nukemite was mentioned as an excellent corrosion inhibitor, one advantage being that maintenance personnel could see through the material to determine whether corrosion was recurring on the treated surface.

One airline stated it covered the entire airframe with a clear plastic spray which had given good protection and reduced cleaning time by one-third. Disadvantages were that the plastic coating rubbed off easily and tended to turn yellow with time.

A representative of Alcoa pointed out that intergranular corrosion could not exist without a lead or connection to the surface of the affected part. 24ST is susceptible to corrosion if badly heat-treated, but will not corrode unless the corrosive action is initiated on the outside surface. The best general procedures to combat corrosion are to provide a maximum number of drain holes and adequate ventilation.

All airlines are experiencing varying degrees of corrosion around the buffet areas. Some are installing cork and Duracote, while others are considering the use of thin stainless steel to combat the problem.

The best guarantee against corrosion in thermal leading edge skins in an effective heat exchanger.

► **Control Surfaces**—Most airlines recover fabric control surfaces every 2½ to 3 years, and rely on the inspector's opinion concerning the condition of these surfaces.

NWA has obtained good service out of reconditioned control bearings and has determined that the cost of reconditioned bearings is approximately 50 percent that of new bearings.

Generally speaking 8000 hours is the expected life of control cables.

Hydraulics

It was apparent that a considerable amount of development of non-flammable fluid has been accomplished without sufficient regard to defining exactly the quality of being "nonflammable." NACA advised commercial companies interested in developing such fluids to pry into the basic scale of flammability to establish precise criteria.

Present specifications for nonflammable hydraulic fluid are unsatisfactory to the extent that they allow a water content. When it is soaked up or evaporated it leaves an inflammable residue. Furthermore, the fluids are excellent electrical conductors.

► **Hydrolubes**—Greatest drawbacks to the hydrolube type of nonflammable fluid are corrosive action due to the presence of water (35 percent in the case of U-4) and questionable lubricity. The H-2 fluid is an improvement over the U-4.

Skydrol, developed jointly by Monsanto Chemical and Douglas, has been used successfully by UAL in cabin

supercharger drives. The only trouble encountered thus far is seal leakage and this is not serious. UAL also converted the main hydraulic system of one DC-4 to Skydrol, the job taking 900 man-hours. The fluid was later removed and put in a second DC-4. As a result of this experience, UAL believes that the time required to convert to Skydrol could be reduced to 600-700 man-hours. Capital will use Skydrol in its newly purchased Super DC-3s.

A spokesman for RPM (Standard of California) suggested a two-step development plan for nonflammable hydraulic fluids. The first, or interim phase would be devoted to obtaining a partially nonflammable fluid. This fluid would require little or no change to existing hydraulic systems and seals. The final phase would see the development of a completely nonflammable fluid, which in all likelihood would require certain changes in hydraulic systems, especially in seals to make its use practical. RPM has currently available a halogenated fluid it feels is truly nonflammable, the representative said.

Ignition

Sperry ignition analyzers, which were discussed at length during last year's meeting, have since been installed and have given excellent results. PAA, for example, has reduced premature spark plug removal from 5.6 to 2.5 per 1000 engine-hours. This represents a yearly saving on this item alone of $7000 per aircraft (Boeing Stratocruiser). The unit has proved to be accurate and it requires very little maintenance.

The General Electric high frequency ignition system will soon go into service test. Laboratory experiments indicate that spark plug life in the order of 1100-2000 hr. may be expected. It also promises to fire badly fouled plugs at high altitudes. The drawback is: A special type of plug is required which, under low production rates, costs some $8.00 per unit, which is more than three times the cost of present spark plugs.

The Scintilla low-tension ignition system has been in use for about two years. It has the advantage of accommodating currently available types of spark plugs, the erosion rate of which has been noticeably reduced when used with this system. A more practical test for spark plugs, one which will more truly duplicate actual operating conditions, is the great need for operators, the engineers agreed.

Engines

UAL and PAA, operating the Pratt and Whitney R-4360 engines in their Stratocruisers have an overhaul period of 600 hours, while NWA engines have an overhaul period of 900 hr.

Number of incidents per 1000 hr. of engine operation:

- Reduction gears, .049;
- Valves, .065;
- Valve guides, .074;
- Cylinders .041;
- Crankshafts .088;
- Master rods, .082;
- Average, .046.

The most critical cylinders on this engine have proved to be B1 and B2.

One of the most important improvements made on the Wright R-3350BD1 engine has been nickel plating the upper piston ring grooves, which has allowed the pistons to operate one full run more than previously.

No significant difference was noted between exhaust collector rings made of stainless steel or Inconel, although NWA and Douglas did express some preference for the latter where extremely high temperatures were encountered.

TWA, UAL and AA have reached an agreement to establish new criteria for inspection times. Subject to the approval of the CAA, overhaul periods of airframes, engines and components will no longer be governed by Safety Release 209, but rather by a formula predicated on accumulated past experience. Extension of overhaul time in increments will also be eliminated. The plan will be ready for implementation within 30 days and will run nine months.

Electrical Systems

Increasing emphasis is being placed on electrical problems due to the enlargement of electrical systems as exemplified in the Boeing Stratocruiser. The electrical session was devoted to discussions more from an engineering, than from a maintenance point of view.

Top engineering personnel from the large airframe manufacturers participated in talk of design policies of modern electrical systems.

Particular interest was shown in protective equipment such as over-voltage protection, ground fault protection and other methods of guarding the aircraft, should one or more circuits fail. General Electric, Eclipse and Jack & Heintz all have developed over-voltage protection systems.

▶**Standard Published**—The Aircraft Industries Assn. has recently published a standard for the installation of electrical systems. This is the first time that airframe manufacturers have agreed on electrical installation standards and the resulting uniformity is expected to prove of enormous benefit to the industry and to the airlines.

The airlines will conform to these standards gradually as their fleets undergo major overhauls, while the Martin 4-0-4 will be the first aircraft whose general design philosophy will abide by them—except for individual specifications of purchasing airlines.

Electronic equipment has given satisfactory performance; however, there is a definite need for more types of "ruggedized" tubes so that the safety of an entire aircraft will not be jeopardized because of the failure of a single filament in an electronic circuit. The importance of this point was underlined by the fact that one airline replaced some 35,000 vacuum tubes in one year's time.

Manufacturers of vacuum tubes stressed the expense and difficulty of developing "ruggedized" tubes. The airlines, however, insisted that the manufacturers expand the number of types being manufactured, and appeared willing to pay tripled cost of these units in view of the fact that laboratory tests indicate that the life expectancy of a

THUNDERJET GETS EXTRA REACH

Two additional 230-gal. fuel tanks are mounted on bomb shackles under the wing of the Republic F-84E increasing the craft's combat radius from 850 to over 1000 mi. With this auxiliary tankage of 920 gal., the Thunderjet now is probably the farthest-ranging single-seat jet fighter in the world. Universal tanks are completely interchangeable from right to left and may be used either on wingtips (with stabilizing fins) or beneath the wings. Navigation light is fitted in nose of each tank. Capacity is marked in both U. S. and imperial gallons. The underwing tanks clear ground by about 6-7 in.

Instrument session at conference was headed by Marvin Whitlock of American (above). Like E. S. Hamm (Northwest), chairman of session on ground servicing and shop equipment, he was not available for group pictures.

"ruggedized" tube could reasonably be six to ten times that of a conventional tube.

Instruments

A step forward over last year's position of the airlines with respect to instruments is their increasing acceptance of electrically driven gyro units, primarily because of the reliability they have shown.

Gyro instrument bearings still give considerable trouble, and the greases and fluids needed for them are expensive. Manufacturers of the latter state that prices will be reduced soon.

Torquemeter installations, although improving in reliability, still leave much to be desired.

IAS Meeting Airs Transport Problems

Blessing of the Bureau of the Budget was expected late last week for the proposed $12-million program for flight testing and certificating new jet transport prototypes under Department of Commerce supervision.

Timetable called for introduction of bills embodying the program simultaneously in House and Senate early this week, with the Truman Administration green light for passage.

Fate of the program in economy-minded Congress still appeared quite uncertain, in view of previous statements by Senate and House leaders (AVIATION WEEK April 10).

Support of the Aircraft Industry Assn. was thrown behind the $12-million testing program last week by Adm. DeWitt C. Ramsey, AIA president, who said the legislation was: "Far from a complete solution to the prototype problem but should be of real value to hasten the day when American turboprop airliners are available, and should supply data of immeasurable assistance in design of a turbojet airliner."

Adm. Ramsey, speaking before the Washington section, Institute of Aeronautical Sciences, forecast that the interim phase of the RTCA all-weather flight control program would have to be consummated, four or five years hence, before turbojet aircraft can be absorbed safely in any considerable numbers on our airways.

Another speaker at the IAS meeting, Rear Adm. L. B. Richardson, research and development director of Fairchild Engine and Airplane Corp., asserted that "freight" planes used today by the airlines are compromises for passenger and cargo operation, comparable to Pullman cars converted for freight. Condition is highlighted, he continued, by the airlift problem posed in a maneuver soon to be held (Operation Swarmer) in which conventional type transports will be able to carry only 10 percent of the military equipment scheduled for airlift, while 90 percent must be carried in military cargo planes.

Four-Engine B-47C To Have More Power

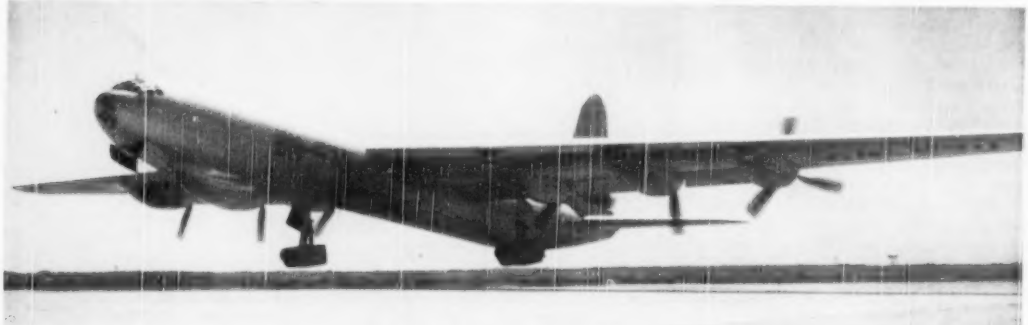
A $4,122,427 USAF contract for modification of one B-47B Stratojet bomber is planned to make a plane which would develop 5600 lbs. thrust more than present version, with two less engines.

The six-engine version now in production is the world's fastest bomber and has a speed of more than 600 mph. XB-47 prototype, from which production version was engineered, last year set a transcontinental speed record of 3 hr. and 46 min.

Experimental "C" version ordered by Air Force will be powered by four Allison J-35-A23 engines, each developing 9200 lb. thrust. Modification cost—approximately ⅛ of an entire B-47 production plane—is laid to extensive changes in wing structure. Current production version engines are GE J-47s, rated at 5200 lb. thrust.

Range of the four-engined B-47 will not be appreciably increased, but added speed will place bomber close to sonic speed. Air-to-air refueling methods now under test for production version, if applied to experimental bomber, would give this nation a jet bomber with the range capabilities of its present B-50 aircraft.

Experimental model, designated B-47C, is not scheduled for production during 1950, the Air Force said.



B-36 TRACK GEAR TAKEOFF

The track-gear-equipped Convair XB-36 made its first takeoff and landing on its new experimental gear at Ft. Worth successfully last week. Photo shows the plane after takeoff with nose track gear already retracted and at the beginning of retraction for the main gear. (Details of the gear were reported in AVIATION WEEK, April 10 issue.) Production B-36s continue to be equipped with the standard quadricycle landing gear. There is no indication track gear will be ordered into production.

Plane Contracts Total $1.4 Billion

Air Force spends $1.2 billion in fiscal 1950 for 1250 aircraft, and Navy awards are put at $234 million.

By Ben S. Lee

Air Force this week disclosed details of its 1950 aircraft procurement program under which it will purchase 1250 aircraft at an estimated total of $1,203,200,000. Dollar value of USAF program covers overall contract data including government furnished equipment.

Navy announcement of fiscal '50 procurement last week included only the awards made to prime contractors. Navy prime contractor awards reported a total $234,927,263. Total allocated by Defense Department to Navy for purchase of aircraft and government furnished equipment in 1950 is $540,900,000.

Boeing Biggest—Boeing Airplane is top USAF contractor in fiscal 1950 with total contract awards of $336.4 million. Contract for $303.6 million is allocated for purchase of B-47 Stratojet bombers and $32.8 million is awarded for purchase of C-97 Stratocruisers.

This latter contract will keep Boeing Seattle in business for at least another year. It simultaneously signifies USAF's intention of swinging to heavier four-engined planes for MATS airlift activity.

▶**Convair Second**—Consolidated Vultee came out in second place in USAF fiscal '50 procurement with contracts totaling $277.6 million for the purchase of B-36 bombers, and the twin-engine pilot-navigator trainer T-29. B-36 contracts total $267.8 million and the T-29 contract totals $9.8 million.

▶**North American**—North American Aviation is in third place dollar-wise this year and received contract awards totaling $180.9 million for the purchase of F-86 Sabres and a later modification of the F-86 redesignated F-95, plus a number of single engine T-28 trainers. Specifically, North American received contracts totaling $34.4 million for purchase of the F-86; $130.9 million for F-95 jet fighter and $15.6 million was allocated for purchase of the T-28.

▶**Lockheed**—Lockheed Aircraft was fourth in fiscal '50 procurement with contract awards totaling $146.9 million. Sum of $120 million went for purchase of the F-94 jet penetration fighter and $26.9 million was allocated for purchase of the two-place T-33 jet trainer.

▶**Douglas Transports**—Douglas Aircraft was given a contract totaling $84.5 million for the purchase of C-124A four engine transports. It is the only other heavy transport ordered from '50 funds.

Fairchild Aircraft received contracts totaling $40.6 million for purchase of C-119 Packets—modified, heavier engined versions of the C-82. Grumman was awarded $7.8 million for the purchase of twin-engined SA-16, designed principally for air rescue service.

Northrop Aircraft received contracts totaling $81.8 million for F-89 Scorpion all-weather jet fighter. Republic Aircraft received contracts totaling $37.4 million for purchase of F-84 Thunderjet fighters.

Final contract awarded by USAF from fiscal '50 funds was made to Piasecki Aircraft Company, $9.3 million following a recent helicopter competition, for purchase of ten-place H-21 twin-rotored helicopters.

▶**Navy Contracts**—Grumman Aircraft Engineering Corp. was high man in the Navy 1950 fiscal year procurement with $88.2 million of new business which includes $57.1 million for Panther F9F jet fighters and $31.1 million for anti-submarine attack planes.

Douglas Aircraft Co. was second in Navy procurement with $50 million for F3D night fighters, and $8.7 million for AD attack-torpedo bombers.

McDonnell Aircraft Corp. was awarded contracts for F2H jet fighters totaling $34.5 million, to take third place in the Navy contractor standing.

Lockheed Aircraft Corp. won $25.4 million in contracts for continuation of production of its P2V Neptune long-range patrol planes, and $1.1 million for its two-place jet trainer equivalent to the USAF T-33.

Glenn L. Martin Co. received contracts for $22.3 million for the P5M.

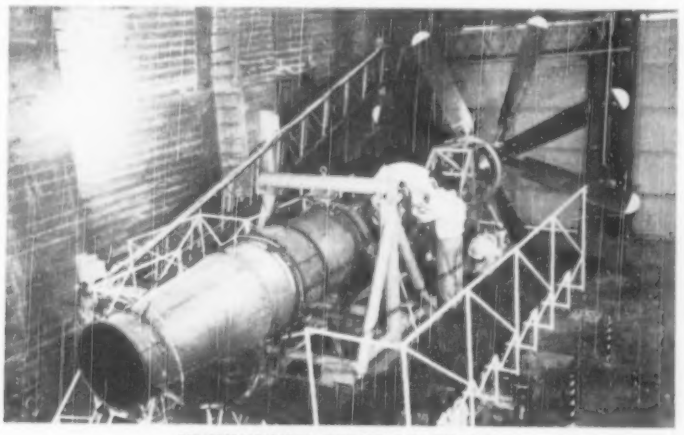
North American Aviation received a $12.8 million contract for the AJ attack plane.

Chance Vought division of United Aircraft Corp. was awarded a $7.8 million contract for F4U night fighters.

Piasecki Helicopter Corp. was the only Navy helicopter contractor, with $3.7 million contract for HUP shipboard helicopters.

▶**Data Delayed**—USAF had planned to release 1950 fiscal procurement data nearly three months ago but clearance of the information was withheld by Defense Department at Navy request until a "unified" compilation system of aircraft procurement statistical data could be worked out. Navy strongly objected to release of any form of procurement information citing that it was extremely difficult to prepare comparative figures to USAF programming.

Last week Navy made an abrupt about face on its stand and released the information while Air Force procurement was still shrouded in secrecy and mired in clearance red tape as a result of the Navy maneuver.



TURBODYNE ON TEST STAND

First test stand photo of the XT-37 Turbodyne turbine-propeller engine, rated at over 10,000 equivalent shaft horsepower shows the huge powerplant fitted with an eight-blade counter-rotating Aeroproducts propeller, gearing mechanism and controls for actual flight installation. It is described by its manufacturer as the most powerful of its type in the world. Turbodyne Corp., Hawthorne, Calif., maker of the engine, is completing a test contract calling for the usual 50 hr. USAF qualification test run for turbines. At one time, Turbodyne contracts called for eight of the big engines, but cutbacks followed. Two of the engines have been completed and a third is approximately 90 percent complete. Original plans calling for the engine to be test flown as a pusher installation on a Northrop XB-49 Flying Wing, were never carried out. Unless development funds are allocated soon, it will be shelved after qualification tests.

PRODUCTION

USAF Bid Information

AF Awards

Air Materiel Command Procurement Division makes available to AVIATION WEEK the latest bid awards, shown on this page. Requests for further information should be addressed to Contracting Officer, AMC, Wright-Patterson AFB, Dayton, Ohio, attention: MCPPSX-72.

ABSTRACTS

For photographic equipment (50-497):
Companies sharing: Eastman Kodak Company, Rochester, on a bid of $27,191.60; L. F. Deardorff & Sons, Inc., Chicago, on a bid of $9733.30, and Western Electric Company, Inc., New York, on a bid of $52,620.00.

For stand, test (50-916):
United Manufacturing Company, New Haven, on a bid of $48,323.00.

For 43,000 ring, external & internal (50-988):
Waldes Kohinoor Incorporated, Long Island City, on a bid of $3426.25.

For photographic equipment (50-584):
Companies sharing: Philip A. Hunt Company, Brooklyn, on a bid of $14,926.92; Prepared Photochems Company, Orange, N. J., on a bid of $23,428.80; Standard Envelope Mfg. Company, Cleveland, on a bid of $2912.25; Mathershamm Paper Company, Washington, D. C., on a bid of $3440.00; National Carbon Company, Inc., New York, on a bid of $2765.39; Eastman Kodak Company, Rochester, on a bid of $677.20; Hubbell & Miller Co., New Rochelle, on a bid of $20,124.65; The Coogan Company, North Hollywood, Calif., on a bid of $163.02.

For 37 former; sheet metal mold steel (50-713):
Companies sharing: Engineering and Research Corp., Riverdale, Md., on a bid of $56,475.000; Industrial Sales Company, Washington, D. C., on a bid of $1456.50.

For aircraft replacement spares (50-761):
Searle Leather & Packing Company, Los Angeles, on a bid of $12,812.69.

For spare parts (50-824):
Companies sharing: Jakes Foundry Company, Nashville, on a bid of $41,880.00; Searle Leather & Packing Company, Los Angeles, on a bid of $10,655.50; The Electric Sprayit Company, Sheboygen, Wis., on a bid of $270.00; and Howe Machinery Company, Inc., Passaic, N. J., on a bid of $7207.50.

For adapter, cap, plug, reducer, sleeve, tee (50-844):
Companies sharing: The Parker Appliance Co., Cleveland, on a bid of $280.68; M. B. Machine Products, Inc., Burbank, on a bid of $954.00; Pacific Piston Ring Co., Los Angeles, on a bid of $1188.00; and A. A. Metal Products Inc., Los Angeles, on a bid of $125.00.

For 50,000 bushings (50-847):
Penjaska Tool Company, Owosso, Michigan, on a bid of $3008.00.

For trichlorathylene (50-856):
Detrex Corporation, Detroit, on a bid of $87,048.00.

For aluminum alloy (50-858):
Companies sharing: Reynolds Metals Company, Louisville, on a bid of $17,844.12, and Aluminum Company of America, Washington, D. C., on a bid of $14,456.61.

For wire, brass and copper (50-870):
Companies sharing: Scovill Manufacturing Co., Waterbury, Conn., on a bid of $5910.42; General Cable Corp., Cincinnati, on a bid of $3187.15, and American Brass Co., Waterbury, Conn., on a bid of $15,914.22.

For screw brazier (50-878):
Reed & Prince Mfg. Co., Worcester, Mass., on a bid of $1341.00.

For 151 board, display (50-919):
Jamestown Metal Corp., Jamestown, N. Y., on a bid of $55,986.00.

For 25 each forge—blacksmith (50-929):
Champion Blower & Forge Co., Lancaster, Pa., on a bid of $6000.00.

For 7 shredder, paper (50-937):
Industrial Shredder & Cutter Co., Salem, O., on a bid of $5290.00.

For resistors (50-938):
Herback & Rademan, Inc., Philadelphia, on a bid of $2431.24, and Neptune Electronics Co., New York, on a bid of $168.00.

For machine, contour, metal sewing (50-1031):
Do-All Cincinnati Company, Cincinnati, on a bid of $70,040.25.

For spare parts (50-744):
The Morse Instrument Co., Hudson, Ohio, on a bid of $73,047.14.

For funnels (50-791):
Companies sharing: Dover Stamping Co., Boston, on a bid of $2397.74; F. H. Lawson Co., Cincinnati, on a bid of $1049.20; Huffman Manufacturing Co., Dayton, on a bid of $3722.37, and The New Delphos Mfg. Co., Delphos, O., on a bid of $383.40.

For bolt, aircraft (50-846):
Companies sharing: Dumont Aviation & Supply Co., Long Beach, Calif., on a bid of $771.20; Air Associates, Inc., Teterboro, N. J., on a bid of $364.30; The Lamson & Sessions Co., Cleveland, on a bid of $559.70; Standard Pressed Steel Co., Jenkintown, Pa., on a bid of $1470.98; Briles Mfg., El Segundo, Calif., on a bid of $362.50.

For portable coolers (50-757):
United Truck & Equipment Company, Inc., Baltimore, on a bid of $486,497.15.

For packing, paper and tape (50-804):
Companies sharing: Carborundum Co., Niagara Falls, N. Y., on a bid of $7113.50; Marine Sales Co., Philadelphia, on a bid of $549.29; Asbestos Textile Co., Inc., on a bid of $569.10, and Raybestos-Manhattan, Inc., Manheim, Pa., on a bid of $1225.90.

For washers (50-818):
Companies sharing: Factory & Yard Supply Co., New York City, on a bid of $234.60, and Ohio Nut & Washer Co., Mingo Junction, O., on a bid of $2417.50.

For cover and cover asembly (50-823):
Beaumont & Crandell Inc., Kansas City, Mo., on a bid of $58,578.13.

For sponge (50-879):
Companies sharing: Albert Bloch & Sons, Inc., New York, on a bid of $40; and O-Cel-O, Inc., Buffalo, on a bid of $4858.

For ring assembly; reduction unit (50-888):
Companies sharing: Thews Specialty Co., Inc., Milwaukee, on a bid of $2320, and Stanhope Products Co., Brookville, O., on a bid of $3546.

For ball bearings (50-928):
Companies sharing: Bearings Co. of America, Lancaster, Pa., on a bid of $10,400; Fafnir Bearing Co., New Britain, Conn., on a bid of $16,130, and Norma-Hoffman Bearings Corp., Stamford, on a bid of $1020.

For lamp assembly (50-955):
Crouse-Hinds Co., Syracuse, on a bid of $5519.25.

For pneumatic lift (50-962):
Globe Hoist Co., Philadelphia, on a bid of $42,937.50.

For bolt, aircraft; nut; plug; tee (50-857):
Companies sharing: Elastic Stop Nut Corporation of America, Union, N. J., on a bid of $10,966.80; The Parker Appliance Company, Cleveland, on a bid of $1470.00; and Air Associates, Incorporated, Teterboro, N. J., on a bid of $967.72.

For shoes, flying (50-1072):
Bristol Manufacturing Corp., Bristol, R. I., on a bid of $28,978.75.

For cable, aircraft (50-942):
Companies sharing: Collyer Insulated Wire Company, Pawtucket, R. I., on a bid of $1652.00; The Electric Auto-Lite Co., Wire and Cable div., Port Haven, Michigan, on a bid of $5451.35, and Graybar Electric Co., Dayton, on a bid of $2714.54.

AF Bid Invitations

Bid openings are 20-30 days after approximate issue dates shown in the following bid proposals. Bid sets containing specifications for items to be procured will be sent to qualified applicants who state bid invitation number.

One bid set will be available for examination without obligation by prospective bidders, after bid publication date, at each of the seven AMC procurement field offices. This will enable firms to see specifications before writing or telegraphing for their own bid sets.

Procurement field office locations: Boston Army Base, Boston 10, Mass.; Government Aircraft Plant No. 4, Ft. Worth 1, Tex.; 39 S. LaSalle St., Chicago 3; Wright-Patterson AFB, Dayton, Ohio; West Warren and Longo Aves., Detroit 32; 155 W. Washington Blvd., Los Angeles; 67 Broad St., N. Y. 4.

INVITATIONS

Bomb rack assemblies, 1-5 items, bid invitation No. 50-1359, issue date 6 April, delivery start 1 Oct. 1950 at rate of 200 per month until completion of contract.

Anti-seize and sealing compound, 1728 jars, bid invitation No. 50-1361, issue date 7 April, delivery within 60 days.

Hangar assembly, 1-3 items, bid invitation No. 50-1358, issue date 7 April, delivery starting within 20 days, complete within 90 days.

Cylindrical tanks, 4 each, bid invitation No. 50-1357, issued date 6 April, delivery within 90 days.

Transformers, 1-8 items, bid invitation No. 50-1273, issue date 7 April, delivery within 30 days.

Valve assembly, 1-5 items, bid invitation No. 50-1356, issue date 6 April, delivery complete by Aug. 1950.

Element; gasket, 1-8 items, bid invitation No. 50-1364, issue date 7 April, delivery begin June 1950, complete Aug. 1950.

Steel-wire, 7500 pounds, bid invitation No. 50-1347, issue date 4 April, delivery complete within 90 days.

Aircraft camera magazine; timing control unit for K-25A camera, 1-2 items, bid invitation No. 50-1351, issue date 4 April, delivery by 31 July 1950.

Temperature indicator, 1-9 items, bid invitation No. 50-1334, issue date 4 April, delivery starting March 1951.

Fixture assembly, 1-2 items, bid invitation No. 50-1349, issue date 4 April, delivery within 45 days.

Phase adapter, 1-3 items, bid invitation No. 50-1346, issued date 4 April, delivery 200 per month starting 60 days after receipt of contract.

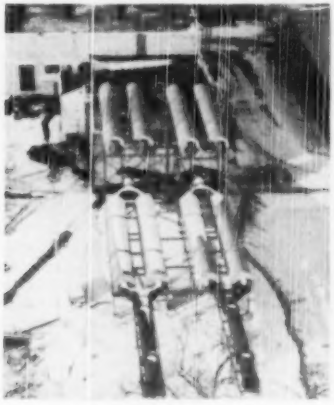
Goggle assembly, 1407 each, bid invitation No. 50-1352, issue date 6 April, delivery within 60 days.

Photographic equipment, 1-2 items, bid invitation No. 50-1350, issued date 4 April, delivery by 31 July 1950.

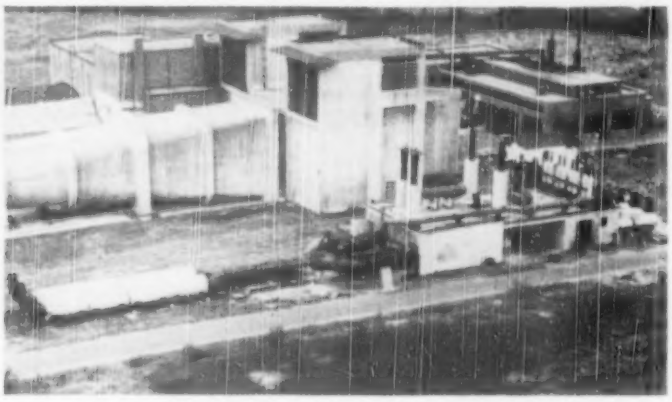
Floodlight, 50 each, bid invitation No. 50-1340, issue date 4 April, delivery within 60 days.

Attenuators, 292 each, bid invitation No. 50-1237, issue date 4 April, delivery within 6 months.

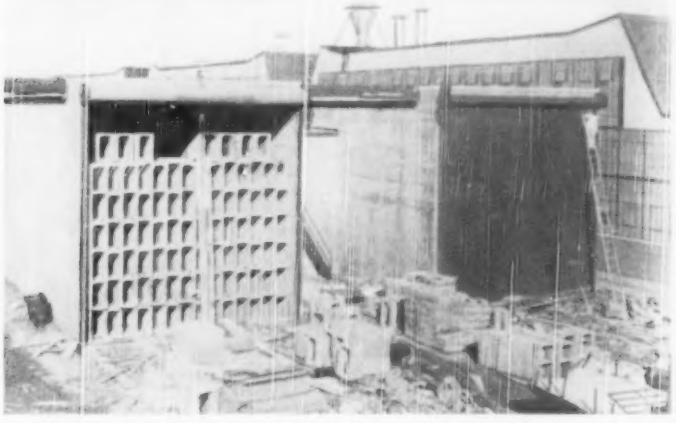
Kit, heater, 1-2 items, bid invitation No. 50-1343, issue date 4 April, delivery 1st article within 30 days, balance complete within 4 months after approval of 1st article.



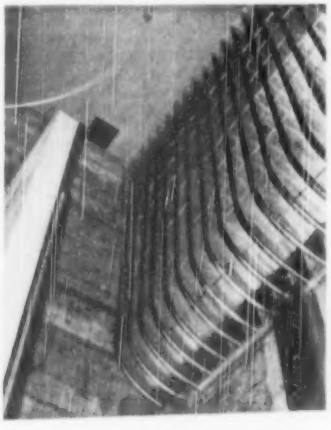
Noise at P&W turbojet compressor test lab is muffled by long tube-like silencers.



Silencing equipment, foreground, also deadens noise from burner test rig. Tubular units are made of steel plate enclosing perforated steel tubes. Wind tunnel is in background.



Experimental test stand buildings for both jet engines and piston powerplants utilize pre-cast hollow blocks comprised of sound-absorbing material mixed with cement.



Glass wool in fine-screen metal sheeting reduces sound level in wind tunnel stack.

How P & W Combats Engine Test Noise

Extensive soundproofing program underway to reduce disturbances created by jet and piston plant proving.

Steady increase in noise from growing power of aircraft engines and rocket motors has created a serious problem of noise abatement at development and test facilities. The overall situation has been, for some time, of tremendous concern to researchers, manufacturers and municipalities alike.

The extent of the problem is pointed up in the announcement by Pratt & Whitney Aircraft division of United Aircraft Corp. that it has already spent over a million dollars on a noise abatement program at its East Hartford, Conn., experimental and test installations, where it has utilized about 2000 tons of soundproofing equipment.

► **Noise Sources**—Some idea of the noise factor encountered at the Pratt & Whitney plant may be gained from these general test details:

All production engines are test-stand-operated for 8 hours before shipment. This includes a 4-hour run following assembly, after which the engine is torn down for inspection. After reassembly, it receives its final 4-hour run.

Experimental engines are subjected to as high as 150 hours of continuous operation.

Test stand runs for both production and experimental engines frequently require day and night operation, and of the 79 cells available for proving complete engines, about 27 are in operation simultaneously.

And latest powerplant refinement to plague sound suppression efforts is the use of an afterburner on the Turbo-

point your operations toward revenue

Two 10-ship Mul-T Hangars by International Steel bring revenue to the Bishop Airport, Flint, Michigan.

Airport managers from coast to coast are finding "pay space" in International Steel Aviation Buildings — space bringing in income to help reduce operating costs.

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Wasp, bringing with it a new peak in engine noise.

P&W's soundproofing program is concerned with these major activities:

▶ **Test Stands**—Soundproofing installations here are of two types.

Precast hollow blocks utilize sound-absorbent material mixed with Portland cement. These are installed in layers around the air intakes and discharge vents where exhaust leaves test cells.

The other type of soundproofing consists of fine-screen flat metal sheeting sandwiching rock wool or glass wool. These are installed to build a series of 16 to 22-ft.-long ribbon walls in the intake and exhaust stacks.

Both types give sound-absorbing characteristics that substantially reduce noise level before it leaves the test cell.

A study is now under way on new methods of sound control to handle the higher noise volumes of the jet cells and the afterburners. Application of the labyrinth principle used in the Willgoos laboratory and more effective materials are planned in a new type test cell silencer now being designed by the Industrial Sound Control Co. of Hartford.

▶ **Wind Tunnel**—Noise from the United Aircraft wind tunnel has been reduced to a point where it is no longer a problem. This was accomplished by equipping the tunnel's air exchanger towers with ribbon walls of the type used in some of the test stands.

▶ **Component Test**—Soundproofing used in the gas dynamics lab, jet burner test stand and at the compressor lab consist of long tubular silencers built by the Maxim Silencer Co., Hartford. These are large steel cylinders enclosing a perforated steel tube, with space between filled with copper wool. Hot gas from the test unit is first cooled by water spray and then passes through the central perforated tube and copper wool before reaching the outer air. These silencers can stand temperatures only up to 400 F., P&W says, a temperature that can be easily exceeded if the water spray cooling system fails.

▶ **Willgoos Lab**—Soundproofing was one of the key factors in design of the new Andrew Willgoos Turbine Laboratory, scheduled for operation shortly. Consultants from Massachusetts Institute of Technology and the Armour Research Foundation were employed to determine the most effective manner.

Out of these studies came a new method that utilized the precast concrete sound absorbent materials combined with an underground labyrinth of reinforced concrete that helps dissipate the sound by bouncing it at absorbent panels at each 90-deg. turn. This also slows the velocity of the gas.

From the labyrinth, the gas pours into a large concrete chamber, further dissipating the noise by expansion. The narrow outlet slots built into the upper wall of the expansion chamber are at ground level and offer further obstruction to sound transmission.

The labyrinth chambers are sunk 14 ft into the ground. Material installed in the roof and walls of the 90-deg. turn section is a clay or shale baked at 2000 F. until it forms clinkers containing many air pockets. These are crushed and mixed with Portland cement and water to form the soundproofing blocks. The air pockets in the blocks act as sound traps.

The blocks are resistant to the high temperatures, but water sprays, also noise reducers, are used to cool the gases and prevent heat damage.

▶ **Ventilating Openings**—In addition to the four silencer chambers at the Willgoos Lab (each accommodating one of the four main test cells), the ventilating air intakes and discharge ducts are protected with special cells to reduce noise level.

These chambers also use a number of 90-deg. turns to block sound transmission. Each unit consists of a series of vertical ribbon walls made of glass wool fabricated into a 2½-in.-thick board held in place by chicken wire fastened to the main structure.

Outside walls of all acoustic chambers in the ventilating system and the outside walls of the main laboratory building are constructed of prefabricated insulated metal siding arranged as a double wall with a foot of air space between the inner and outer walls.

▶ **Roof**—Main service building roof uses precast slabs of wood fiber, Portland cement and sand (3¼ in. thick) topped by 2½ in. of poured concrete.

Walls and roofs of the test cells are of heavily reinforced concrete for both noise suppression and safety from flying parts or explosion of components.

Gas-Turbine Metal

Kentanium, heat-resistant metal recently developed by Kennemetal, Inc., Latrobe, Pa., will be the basic material in vital parts of a 200-hp. experimental gas turbine being built by that firm, to give more power at less weight.

By using the metal in main turbine parts, it "becomes feasible to operate at 2200 F., and thereby attain much greater efficiency," the firm states. In addition to having "much less weight than conventional heat-resistant materials," the metal is reported to have high resistance to oxidation, withstand thermal shock and retain "unusually great strength at elevated temperatures."

The company is building the 200-hp. unit and will conduct tests as a special service to potential users of Kentanium.

Every J & H Jet Starter must pass this and many other exacting tests before shipping.

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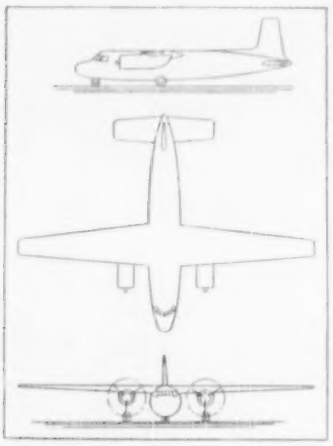
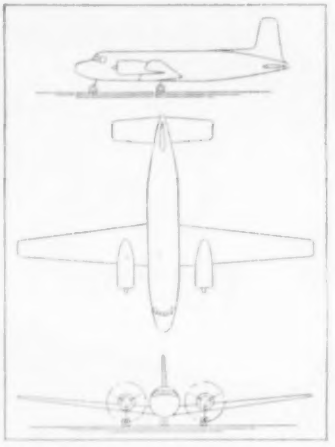


HIGH WING . . .



LOW WING . . .

Configurations based on ALPA proposals for an airline workhorse replacement for DC-3.

Pilots' Idea of Short-Haul Plane

Need for DC-3 replacement still has not been filled, ALPA feels, so it offers its own design for job.

Need for a low-density-traffic plane as a replacement for the veteran DC-3 is still apparent to the Air Lines Pilots Assn., despite the various aircraft that have been produced and sold for similar service.

Pondering whether airline "skin-the-cream" economic philosophy stems from non-availability of such a plane or whether non-availability is responsible for this philosophy, the organization nevertheless holds that air line pilots have little doubt such an aircraft is required.

They are certain it can be built despite the design and manufacturing challenge which may be involved.

In a recent issue of its "Airline Pilot," ALPA advances pointed specifications compiled by its engineering and air safety department for a "true workhorse" replacement (AVIATION WEEK, Mar. 27).

Since the proposals indicate a close evaluation of equipment and operating requirements from the pilot point of view, any substantial variance in a new design would probably draw ALPA criticism.

In substance, here is what ALPA specifies.

► **Basic**—The configuration, allowing for a passenger-cargo combination, would be a twin-engine, low- or high-wing design, selection being made only after a careful study of the many service factors involved. Good passenger vision is considered an important detail.

Size would be predicated on greatest utilization of DC-3 servicing and maintenance facilities—hangar space, stands, fueling apparatus—and allow for a four-seat-wide and aisle-space arrangement, except possibly at fuselage rear. Seating capacity would range from 20 to 26. No chairs would be installed in line with propellers.

Though high cruising speed is wanted, it must not be obtained at the expense of high maneuverability or low landing speed. A stalling speed of not more than 70 mph. is specified as a prime consideration to cope with conditions at small-town airfields.

► **Safety Factors**—These play a large part in ALPA's proposals. The design, it says, should include these specific features:

- Cockpit arrangement to reduce pilot fatigue.
- Good control as close to stall as is possible.
- Reliable deicing for windshield.
- Lights for showing ice on wing leading edge.
- Reversible propeller.
- Fast acting landing gear, which includes steerable nose unit, and incorporating dual tires, with one tire able to support the load.
- Shutoff valve for all flammable fluid lines, located well aft of firewall.
- Accurate detection means for in-flight fires.
- Baggage compartments accessible for combating fire.
- Adequate fuel supply, in flexible cells.
- Electrical system affording more than one energy source for equipment.
- No electrical valves.
- Engine exhaust heat for cabin, cockpit and thermal anti-icing.
- Space in fuselage nose for future installations—collision warning devices, navigational aids, radar, etc.
- Inspection means for checking highly stressed structure.

► **Mockups**—ALPA places high importance on mock-up studies to aid in specification of windshield characteristics, instrument and control arrangements, cockpit lighting, and equipment placement.

The windshield mockup is specified to be full-size, affording true observation. It should face an open area—airport or unobstructed one-mile view. Pilot and copilot seats should be at the same height as projected for those in the finished plane.

Front and side windows should be placed close as possible to pilot—close front windshield giving better visibility during precipitation conditions, closer side panels affording good vertical visibility without need for pilot to lean over.

Best check is considered to fly the proposed windshield both in daylight and at night, and under precipitation conditions at both these times.

A mockup is also suggested as the best means of obtaining a cockpit that will permit pilot "to do a good, safe job of manipulating the various controls and reading the instruments . . .", and it is held that a group of airline pilots should review the mockup study for change recommendations.

Cockpit and instrument lighting, too, is considered to be ideally adapted for study by mockup. It is suggested that the mockup arrangement be placed in a similar airplane cockpit and checked by night flight.

Holding that means for rapid and adequate inspection of critical mechanical units will prevent fatal accidents, ALPA believes in the utilization of mockups complete with lines, leads, cables, etc., as an effective coordination between structures, equipment and airline maintenance engineers.

And coupled with these suggestions, ALPA feels that to bring out design bugs before full production, a minimum of 1000 hours of severe service testing should be accumulated in regular scheduled operation, without passengers.

This service testing proposal would seem to add considerably to the time generally expended now in initial proving of transports.

Though there is no question that service testing is required, there is considerable controversy as to value of longer and longer periods.

Ram Jets get a 'Flight Engineer'

▶ A ***human*** flight engineer would have to shrink to the size of a gremlin to operate a ram jet. He would have to withstand temperatures from −100E to +700E... pressures from that at 100 feet under water to that at 30,000 feet in the air. On top of that... calculate and react in less than a second to complex mathematical problems.

▶ Yet the ram jet needs a flight engineer... and gets one in Wright Aeronautical's new ***power control system.*** It performs ***automatically*** the functions of a flight engineer on a modern airliner.

▶ Actually it does a great deal more, for in ram jet operation, where supersonic speeds prevail, much wider ranges of air flow, temperatures and pressures are encountered than in any previous-type aircraft. The power control checks instantaneous changes in air density, determines the jet's fuel requirements, and actuates the missile's controls in a fraction of a second. Result... smooth, highly efficient engine performance.

▶ These power control units—and all other ram jet components—are now under development in Wright Aeronautical's new ram jet laboratory. Here is another indication of this company's leadership in supersonic ram jet research and development.

Wright Aeronautical Corporation, Wood-Ridge, New Jersey

CURTISS WRIGHT

Rain Damage

Studies with aircraft exterior plastics give new erosion data.

One of the major Air Force problems concerning the use of plastic materials in aircraft is erosion of exterior, low-pressure laminated parts, occurring during high-speed flight through rain.

This difficulty first was manifested in the latter part of 1945, on some aircraft operating in areas of heavy and extended rainfalls. But with today's aircraft flying at much higher speeds, the consideration has become much more urgent.

In 1945, investigations of rain erosion of plastic materials were undertaken under the sponsorship of the Air Force, and these studies are still in progress. While no ultimate material has been found, the investigation has been successful in that many vital factors affecting rain erosion have been determined.

Also, it has been found that certain surfacing materials give relatively good protection to the plastic laminate and at the same time do not appreciably affect the electrical and mechanical properties of the sandwich construction.

▶ **Test Apparatus**—There are mainly two types of test apparatus for laboratory evaluation of rain erosion. These are the pulsating jet-impingement type and the rotating-arm type testers.

The pulsating jet-impingement tester directs a stream of water perpendicularly against the specimen. The jet is created by pumping through an orifice under pressure, from which the speed of the water is calculated. This test, in its present state of development, does not seem to correlate with service trials on elastomeric and very hard coatings.

The rotating-arm type test consists of a whirling arm rotating under a water spray. Good correlation of results as to relative rating of materials has been found between this test apparatus and service runs.

▶ **Speed Effect**—Studies show that of the variables investigated, speed has the greatest effect on the rate of erosion of plastics. The rate increases with approximately the 6 to 8th power of the speed.

Thus, it may be seen that while a material may be satisfactory for flight through rain at 200 mph., it may be entirely unsatisfactory when flown through rain at 500 mph.

▶ **Leading Edge Curvature**—Shape of the airfoil affects the rate of erosion. For instance, a glass polyester laminate with a leading edge radius of curvature of ¼ in. eroded 8 times faster than a flat plate of the same material. For radii of curvature up to 1½ in., the slope of the curve for rate of erosion vs. time of exposure is steep.

For radii of curvature 1½ in. to flat plate, the curve slope is relatively level. This indicates that for least erosion the leading edge should have a radius of curvature of 1½ in. or greater.

▶ **Angle of Attack**—Influence of rain drop impact on surfaces set at angles of 15, 30, 45, 60, 75, and 90 deg. was studied. Repeated tests showed that 60 deg. was the critical angle. At or above this angle, the rate of erosion was extensive; below 60 deg., rate of erosion was considerably less.

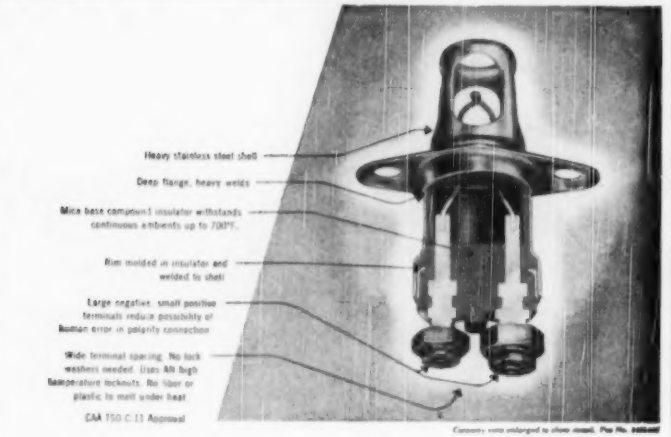
Indications are that at angles of impact of 15 deg. or less erosion should not be experienced under conditions of normal airflow.

▶ **Temperature, Fillers**—Rain temperatures from 40 to 80 F. were found to have no discernible effect on the rate of plastic erosion.

Rainfall density of 3 in./hr. and 2.5 mm median droplet size eroded a glass polyester laminate 4 times faster than when tested at 1 in./hr. rainfall and 1.9mm. median droplet size, other conditions being the same.

Only a small difference in erosion rate was found by using different glass

Based on a recent paper by W. G. Ramke, Air Materiel Command, Wright-Patterson Air Force Base, before the Plastics Seminar sponsored by the Society of the Plastics Industry, Washington, D. C.


Heavy stainless steel shell
Deep flange, heavy welds
Mica base compound insulator withstands continuous ambients up to 700°F.
Rim molded in insulator and welded to shell
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Wide terminal spacing. No lock washers needed. Uses AN high temperature locknuts. No fiber or plastic to melt under heat.
CAA TSO C-13 Approval

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The new Edison 35534 Thermocouple Detector is inter-changeable with the previous model. It further improves the performance and reduces maintenance requirements of Edison Aircraft Fire Detection in aircraft power zone service. Send for Publication No. 3003-A.

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fabrics in the laminate, such as 181, 116, or 162. Other fillers, such as Nylon fabric, paper, etc., and resins, such as silicone and melamine, had no appreciable effect on the rate of erosion.

▶ **Resistance Bettered**—But it was found that high-pressure cotton fabric phenolic laminates are more erosion-resistant than are conventional polyester glass laminates.

Also, a void-free laminate has substantially better erosion-resistance than a conventional laminate. The so-called void-free laminate is obtained by removing most of the air between the plies during lay-up of the polyester glass laminate and curing at a slow rate, to produce a material that is comparatively void- or porosity-free.

A layer of resin on the surface of the material, such as pregelling resin on the mold surface just prior to lay-up of the laminate, also increases the resistance to erosion to approximately the same extent as with the void-free laminate.

As the speed of test is increased, this advantage decreases and none of these materials are regarded as having acceptable erosion resistance.

▶ **Neoprene Action**—Many surfacing materials have been evaluated for rain erosion resistance. Those having the best resistance are elastomeric materials, polyethylene sheet and Neoprene rubber. Also, flame-sprayed polyethylene appears to be promising.

Of all the Neoprene rubber materials tested, only two gave any degree of sufficient protection to the laminate. These were Gates Engineering Co.'s heat-drying Neoprene, Gaco N-200-5, and Minnesota Mining & Mfg. Co.'s air-drying Neoprene, No. 45756.

It appears that a minimum thickness of approximately 0.010 in. and a good bond of the surfacing material to the laminate are necessary for effective protection.

Compared to other materials tested these two Neoprenes and polyethylene give relatively good erosion resistance in laboratory tests at 500 mph.

▶ **Lab, Service Tests**—For example, on a rotating arm tester using airfoil specimens with about 4 in. curvature, the conventional and void-free laminates erode after approximately 14 min. at 500 mph. The laminates surfaced with .010-in.-thick Gaco Neoprene erode through the surfacing material after 15 to 24 min. at 500 mph.

Service tests have shown that the conventional laminated vertical stabilizer tip of a jet plane eroded through 2 to 3 plies in approximately 14 min. during 400-mph. flight through rain. The void-free laminated part surfaced with 0.010 to 0.012-in.-thick Gaco Neoprene suffered no damage up to 10 hr. of flight through rain at 400 mph.

(Continued on next page)

The Engineer says:
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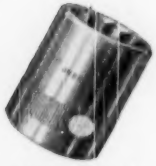

NAS INTERNAL WRENCHING LOCK NUT

. . . a superior safety nut. Sizes from #8 to 1".

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. . . are made to latest NAS Specifications. Threads are fully formed by rolling after heat treatment, an important UNBRAKO feature. Full range of standard sizes.

FLEXLOC

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. . . incorporate the famous FLEXLOC self-locking principle and one-piece, all-metal construction. The exceptional reliability of this construction has been proved by the millions of FLEXLOCS used in the aircraft industry.

Other outstanding advantages include:

Maximum tensile with minimum weight

Approved under latest NAS Specifications

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No special tools needed—use standard 12-point socket or box wrenches. Designed for use in cramped quarters

Sizes from ¼" to ¾" NF Thread Series

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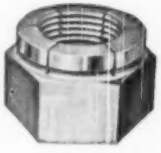
FLEXLOC

ONE-PIECE SELF-LOCKING NUTS

The one-piece FLEXLOC is both a stop and a lock nut, due to its resilient segments which lock *positively*, even under extreme vibration. Torque is unusually uniform—within a few inch pounds. "Thin" and "regular" types; NC and NF threads. Officially approved by many U. S. depts., bureaus, etc., and CAA for aircraft use.



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On this same airplane, the leading edge of the horizontal stabilizer was eroded almost completely through the cladding in 20 hr. of flight through rain at 400 mph. The horizontal stabilizer is aluminum alloy with aluminum clad and has a larger radius of curvature than the vertical stabilizer tip.

► **Procedure Considerations**—Comparing the service results with those obtained on the laboratory rotating arm tester using the small airfoil-shaped specimen, it would seem that the laboratory test is a considerably accelerated condition.

A more simple and rapid laboratory test procedure than the rotating arm apparatus is needed to evaluate the rain erosion resistance of materials. For the whirling arm tester to erode some materials within a reasonable length of time the speed required is high.

► **Water Agitation**—A cavitation erosion test apparatus for evaluating the resistance of plastics also has been developed. It is based on an apparatus used to evaluate the resistance of metals to cavitation erosion.

The rapid erosion of the specimen is accomplished with this instrument through violent agitation in water. It is a 10kc. magnetostriction oscillator with a power output of approximately 200w. One end of a magnetostriction rod is extended through the magnetic structure so that test specimens may be fastened to this end and immersed in water.

This instrument produces a fixed frequency and fixed amplitude of the test specimen displacement in the water, so that it is, essentially, a comparator wherein the operator's variable is time of erosion. The device has been found to rate some materials in a comparable manner to the rotating arm testers.

But, tests of many materials are not complete and it is not yet known whether it can be used for accurate evaluation of rain erosion resistance of plastic materials.

Investigation of the rain erosion problem of plastics is continuing at research institutions under Air Force sponsorship and at various aircraft companies.

High-speed photography is being used to study erosive action of droplets contacting the test specimen. The energy relations involved in interaction between specimen surface and the rain drops, forces developed, etc., are being obtained and analyzed for the purpose of determining the properties of the materials and necessary bond strengths.

And, to obtain service test data, airfoil-shaped specimens of various plastic materials are being attached to the wing leading edges of a large number of service jet fighters.

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You pay a premium for these advantages, of course—but you get big dividends back in the form of fuel economy, costly man-hours saved, delays avoided.

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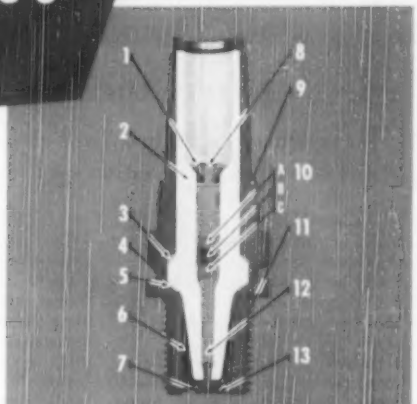
Look at the sectional drawing and see why the rugged AC-181 can save you time and money.

AC SPARK PLUG DIVISION • GENERAL MOTORS CORPORATION • FLINT 2, MICHIGAN



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1. Patented CORALOX. 2. No flashover downward from contact cap. 3. Eliminates dirt trap between core insulator and shielding barrel insulator. 4. Facilitates cleaning terminal well. 5. Mechanically rugged.
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5 Nickel gasket
6 Ample clearance for abrasive blast cleaning
7 Platinum center electrode tip .060" dia.
8 Steel core pin
9 Brazed one-piece construction with zinc-plated finish.
10 Gastight Hermetic seal
(A) Copper-glass conducting seal. (B) Glass-graphite resistor seal, halving electrode wear. (C) Copper-glass conducting seal.
11 18 MM threads, precision-rolled to mirror finish
12 Silver, centrifugally cast to insure good heat conducting contact with insulator
13 One of two large .040" square platinum ground electrodes

AC SPARK PLUGS
AIRCRAFT

AC Plugs for Jet Engines have also participated in the establishment of many speed records.

High Performance Wing Tested

Increased speed and payload claimed possible with airfoil and strut combination on French HD 10.

(McGraw-Hill World News)

Paris—The experimental prototype Hurel Dubois 10, one of the most unusual and technically interesting prototypes developed in France since the war, has completed its test flights successfully.

Its builders claim the new wing design tried out on the plane, adapted to commercial transports, will cut operating costs to less than 13 cents per ton-mile for payloads ranging from three-and-a-half to 40 tons.

► **Unusual Struts**—The HD 10 was built to confirm the superior flying qualities of the extremely high aspect ratio wing braced by unique struts patented by the Societe Hurel Dubois, over the conventional cantilever wing. The low profile drag struts supporting the wing are aerodynamically designed to give extra lift, functioning as sort of auxiliary wings. Use of these struts is stated to make it possible to more than double the aspect ratio without increasing the wing weight.

► **High Load Factors**—Hurel Dubois engineers claim that with their designs it is now possible to attain load factors of 22 lb. per hp. with a wing loading of 41 lb. per sq. ft., or 82 lb. per sq. ft. wing loading with 13.6 lb. per hp.

The company claims their new wing theoretically increases speed 30-40 percent and payload up to 200 percent for a given horsepower. The Ministry of Air has reported that flight tests of the HD 10 prototype have substantially confirmed many of these theoretical predictions.

► **Specifications**—The plane's characteristics are:

Span 39.4 ft., wing area 48.4 ft., aspect ratio 32.5, wing chord 15.75 in. Weight empty 725 lb., weight loaded 1055 lb. Powered by Mathis 40 hp. engine. Power loading 26.4 lb. Wing loading 22 lb./sq. ft. Top speed 150 mph., ceiling 18,000 ft. Fuel consumption 65 mi./gal.

These characteristics are said to permit the HD 10 to fly high and at very low power—16 hp. with flaps up and 12 hp. with flaps down.

► **Applications**—The company claims that the HD 10 has demonstrated that its wing design can improve the performance of all types of subsonic aircraft. Here are some of the applications reported.

• Small and medium transports. Hurel Dubois engineers claim their wing would permit building planes with a

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total weight of 8800 lb. and a payload of 3300 lb. They estimate that even such little planes could operate for less than 13 cents a mile. Theoretically this cost could be reduced progressively as weight climbed to 40 tons. These results could only be obtained at cruising speeds of 190-220 mph. Greater speeds would disproportionately increase the operating cost and mean carrying less payload.

- Long range military observation or liaison planes.
- Distance or altitude record breakers.
- Personal planes combining low horsepower with high speed. One design suggested by the company is a 120-hp. four-seater cruising at 170 mph.

New Device Analyzes Upper Air Samples

Use of an instrument called an "analytical mass spectrometer" may lead to development of improved weather forecasting techniques by permitting collection of data to be used in new studies of the composition of the earth's atmosphere.

The instrument separates gas molecules according to their weight and is being used by scientists at the Air Force Research Laboratory in Cambridge, Mass., to analyze air samples captured more than 18 mi. above the earth. The device was developed recently by the General Electric Co.

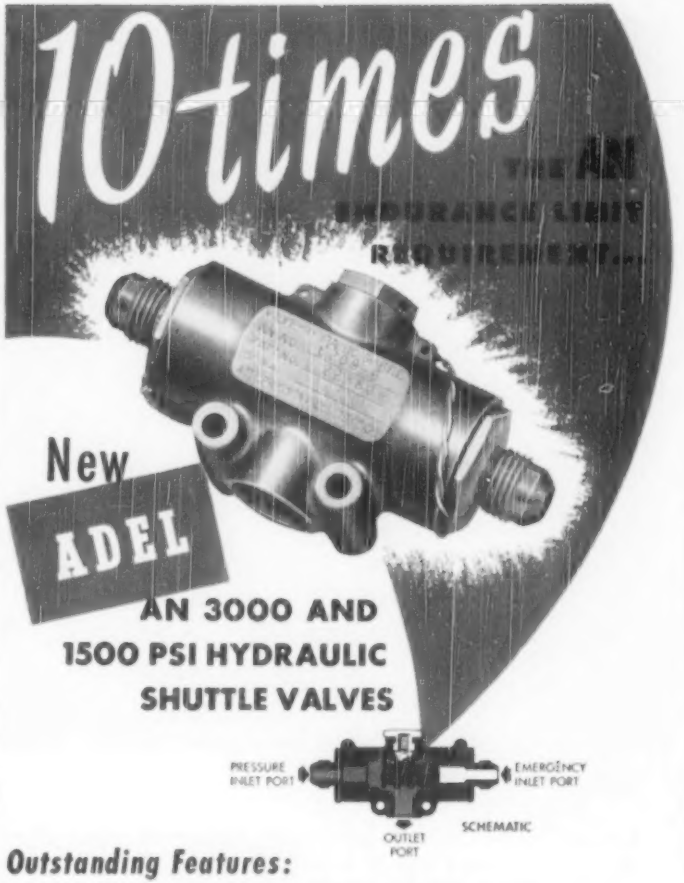
The high-sensitivity range of the mass spectrometer reportedly will aid in the study of reactions which meteorologists believe take place among constituents of the atmosphere as a result of absorption of radiant solar energy.

GE engineers say the instrument is so sensitive that under some conditions it can detect a gas which is only 1/100,000 part of another gas.

In operation, the gas to be analyzed is introduced into an ionization chamber where its molecular particles are given electric charges. The molecules then are accelerated through a magnetic field which changes their direction of movement.

The lighter molecules are deflected to a greater extent then the heavier ones. This results in the gas being spread across the instrument's collector plate in a molecular pattern according to their weight.

Since it separates molecules of different weights, or masses, the instrument is said to be useful in recording presence of isotopes, particles which react chemically in the same way as others, but differ from them in mass and atomic structure. According to GE, scientists at the Cambridge lab will use the instrument to seek upper-atmosphere isotopes which have not been discovered.



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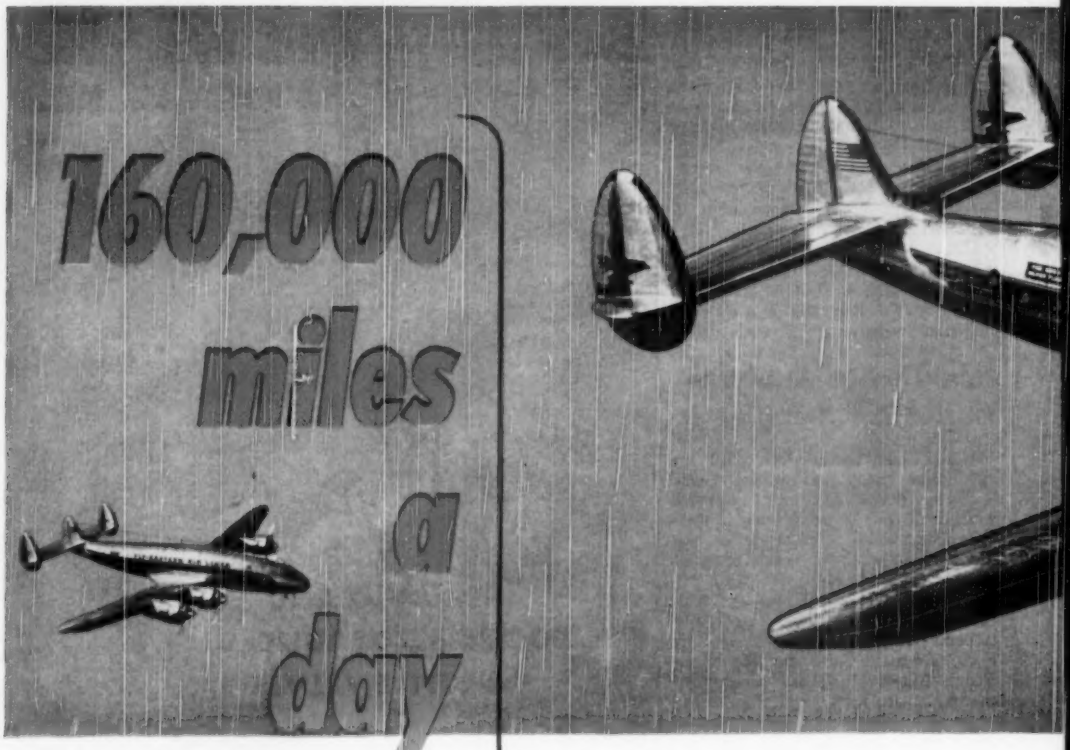

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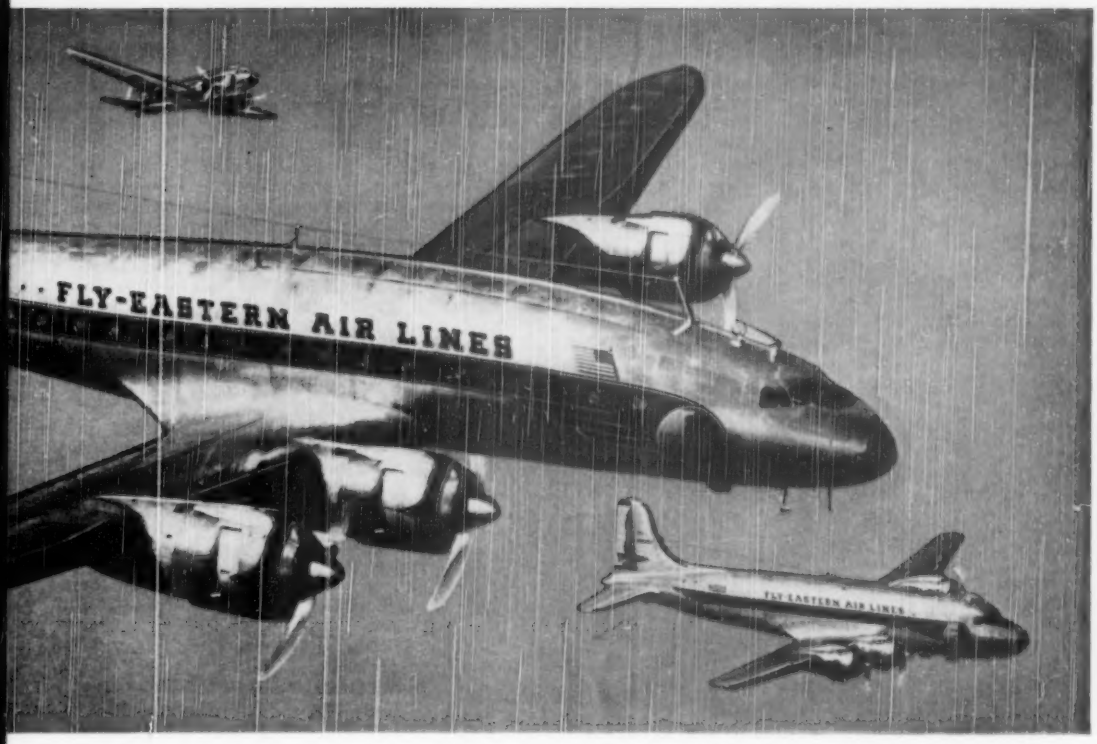

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Letter Symbols For Aero Sciences

The wide variety of symbols used in technical paper and text presentation in the field of aeronautics frequently has been a source of confusion. To end this condition, a new compilation has been published by the American Standards Association.

Titled "American Standard Letter Symbols for Aeronautical Sciences, Z10.7-1950," the work brings up to date a standard adopted in 1930 but now obsolete.

The new publication recommends standard letter symbols for 400 primary and secondary concepts, many being in agreement with American Standards for other phases of science and engineering.

The National Advisory Committee for Aeronautics and the Institute of the Aeronautical Sciences collaborated in sponsoring this phase of a general program of standardization for letter symbols and abbreviations with five major engineering organizations.

The new document consists of two main tables—one alphabetical by symbols, the other alphabetical by concepts.

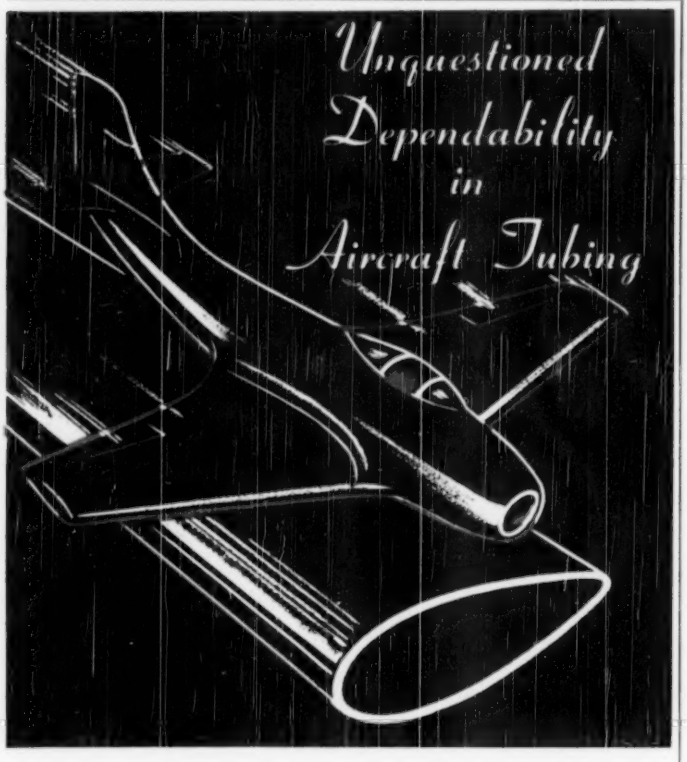
Included in the first table are dimensional characteristics of the various concepts in terms of mass, length, time and temperature; indications of agreement with other current American Standards; and helpful remarks and definitions. Accompanying this table is an alphabetical list of symbols used as subscripts to represent secondary concepts.

Letter symbols for special concepts in meteorology and servomechanisms are not included in this standard but are under development.

In general, the letter symbols have been selected with consideration of the fact that typewriters commonly are used in some stage in the duplication or reproduction of manuscripts. For this reason, variations such as the use of bold face type have not been used to distinguish letter symbols.

The basic principle of consensus of all who are substantially concerned with the scope and provisions of the standard was observed in an effort to clarify all discussion and the dissemination of technical information on subjects in this field. The standard is the product of representatives of these groups under ASA procedure.

The publication may be obtained from the American Standards Association, 70 East 45th St., New York 17, New York at $1.25 per copy.



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SERVING THE AIRCRAFT INDUSTRY FOR 30 YEARS

New Titanium Alloy Groomed for Jet Use

A new titanium alloy, developed under a Navy Bureau of Aeronautics program started in 1946, is being considered for limited use in jet engines—compressor blades and disks—upon satisfactory completion of service tests now underway.

The alloy embodies 5 percent chromium and 3 percent aluminum. It probably will eventually replace commercially pure titanium, already approved by the Bureau for use in engine firewalls, shrouds and related parts, such as diaphragms and baffles.

However, this will have to wait until more experience is gained with the alloy, the Navy says. For the present it is not yet being fabricated in production quantities, but the Bureau is working closely with interested industrial concerns to facilitate full industrial application."

At its present stage of development, the alloy is not considered suitable for applications where temperatures exceed 1000 F., hence, its use in jet turbine blades is not being considered now.

Advantages claimed for the new alloy are that it is as strong as high-strength steel while weighing half as much, and is basically non-critical, since its major ingredient, titanium, is available in large quantities on the North American continent. Development of the material was carried out under Navy contract by P. R. Mallory & Co., Indianapolis, Ind.

1919

Alcoa Aluminum flew the Atlantic with the NC-4

She looked like a "box kite on a canoe". But the Navy's big NC-4 flying boat made history as the first plane to span the Atlantic Ocean. She was built before aluminum became the leading flight material. But her fuel tanks and fuel lines were Alcoa Aluminum —as were principal parts of her four Liberty engines. With aluminum's help to make her airworthy, the NC-4 blazed a trail for today's transocean airliners.

1950

Alcoa pioneers again with Lighter Flight-metal Castings

Many an aircraft design problem today centers around improving thrust-weight ratio. Often Magnesium Castings by Alcoa are the answer. They weigh 75% less than steel, 35% less than aluminum. Alcoa foundry specialists can help you utilize magnesium's lightness to the best advantage, can meet your toughest requirements for sound, uniform castings.

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Send for your free copy of the useful manual, "Designing with Magnesium". Contains full information on properties and fabricating practice.

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Martin Cuts Cost By 'Cutting' Blueprints

A new system of distributing blueprints already is bringing in savings at the rate of more than $100,000 annually for the Glenn L. Martin Co., that firm reports.

Blueprint costs, the Baltimore company states, have been cut more than 50 percent compared to wartime figures. Assuming the same level of production as exists today at Martin, 1,000,000 prints would have been needed to do the same job that now only requires 400,000 annually, says Robert B. Smith, manager of the firm's office management-reproduction section, in an article appearing in the Martin house organ.

This has been achieved through the selective reproduction, distribution and usage control system, which has reduced the reproductions-per-drawing average to approximately 17 prints.

The system is set up this way: An analyst continuously studies blueprint requirements of all departments, sections and groups, to insure that engineering data to be distributed will have a specific, justifiable use. Prior to initial release of any drawing, he lays out a distribution schedule which is based on the needs of each department.

Drafting and release procedures and plant layout are taken into account along with scope of operation, timing elements, etc. As work on the Aircraft model progresses, changes in company activities affecting data distribution are studied and necessary revisions made in the procedure.

Each release of an engineering drawing is reviewed as it flows into the reproduction facility, and the original estimate of the number of copies required for a department or group is confirmed, after checking possible need for real-location in some cases.

A coded card is prepared for each drawing, showing the number of copies required, and blue prints finally are reproduced and distributed in conformity with this selective determination.

Where advance copies are required by certain groups, such requests are given a special screening by the analyst so that when the drawing is prepared for regular issuance, neither reproduction nor the distribution will be duplicated.

As a dividend, this system cuts blueprint handling and processing routines in each department, since each group receives only those prints it really needs. Further, "quality and legibility of the prints is enhanced by the diminished demand for them," Smith says.

The old system of print distribution at Martin called for the issuance of a standard quantity of data to all departments and groups in any way concerned with engineering or manufacturing.

BARBER COLMAN

HIGH-SPEED POSITIONING CONTROL

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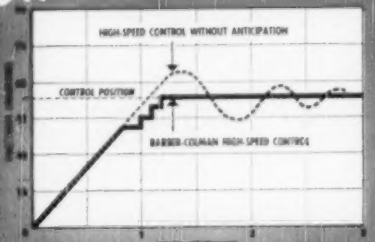
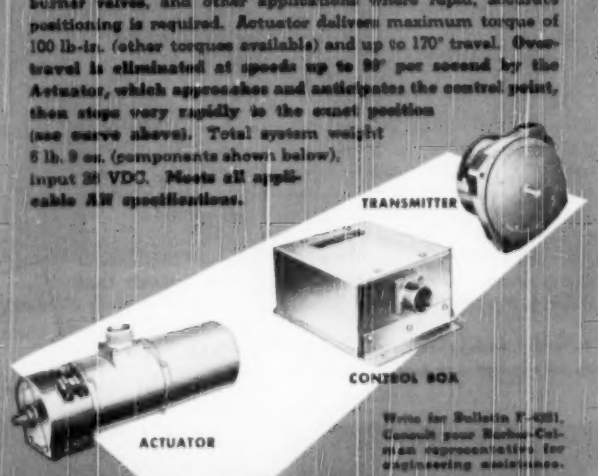


Designed for remote control of aircraft throttles, jet afterburner valves, and other applications where rapid, accurate positioning is required. Actuator delivers maximum torque of 100 lb-in. (other torques available) and up to 170° travel. Overtravel is eliminated at speeds up to 90° per second by the Actuator, which approaches and anticipates the control point, then steps very rapidly to the exact position (see curve above). Total system weight 6 lb. 9 oz. (components shown below). Input 28 VDC. Meets all applicable AN specifications.



Write for Bulletin T-631. Consult your Barber-Colman representatives for engineering assistance.

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Copper-Core Sheet For Heat Use

A new clad metal sheet with a copper core, serving to dissipate troublesome high heat from hot spots is being studied by jet power plant engineers. Excellent structural and non-oxidizing properties are also claimed.

The product, called Rosslyn metal sheet, has its copper core metallurgically bonded permanently on both sides with stainless heat-resistant steel or Inconel. Maker is American Cladmetals Co., Carnegie, Pa.

Those who have already done some work with the new metal also anticipate that it will conserve critical strategic materials such as columbium and colbalt.

► **Jet Engine Applications**—Turbojet combustion chamber liners made of Inconel-type Rosslyn metal have been built using conventional production methods, and easing of louver fabricating problems are reported. The metal has also been used for nozzle diaphragm blades and is reported to minimize cracking and warping.

Other uses seen are: Turbojet tailpipes, where it is expected to result in

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reduced initial cost and release of extremely critical alloy elements now used; flame shields in ramjets; and in construction of liquid propellent rocket engines.

► **For Conventional Aircraft** – Adaptations of the metal to conventional aircraft parts such as heaters, and augmentor tubes utilizing engine exhaust for anti-icing, cabin heating, etc., are also possible. Regular production tools are being used to make three-ply, seam-welded assemblies up to 11 ft. long, using automatic machines.

The metals are bonded by means of the Kinney process developed by Joseph Kinney, Jr.

Aero Data Service Offered by Dutch

The Dutch National Aeronautical Research Institute (Nationaal Luchtvaart laboratorium), Amsterdam, is extending to interested groups in other nations subscriptions to its central documentation service.

This service is set up to review and classify all papers in aeronautical and related fields which are available in libraries of participating institutions and are considered to have future value.

The Institute has been carrying out documentation of aeronautical data on behalf of all main aeronautical institutions in the Netherlands since 1948. It believes difficulties encountered and solutions found in setting up this service would be of interest to groups in the U.S. faced with similar problems.

The Dutch group points out that if a sufficient number of institutions abroad proves to be interested in a subscription, it would be worthwhile to undertake the task of translating the classification index into English and, if desired, preparing all abstracts in English. International cooperation in such a service might bring about improvements in methods of aeronautical documentation and benefit aeronautical science as a whole.

The service presently is set up this way: After a particular paper is reviewed by qualified specialists, the results are sent to subscribers in the form of a card which contains data on the extent of the paper, where it can be found, the classification number, and an abstract, usually in language of paper itself, not exceeding 60 words. A complete classification index also is available.

The service is supported by the Netherlands Air Force, Royal Fokker Aeroplane Co., KLM Royal Dutch Airlines, Department of Civil Aviation and the Institute itself. Non-participants can subscribe for a "relatively moderate" fee.

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FINANCIAL

Transcontinental Lines Come Back

United, TWA and American 1949 reports show how far carriers have recovered from postwar slumps.

Real progress and substantial recovery in earning power is revealed in the 1949 annual reports released by the three transcontinental airline members of the "Big Four."

The transcontinentals involved—American, Transcontinental & Western Air, Inc. and United Air Lines—have one major quality in common: none of them can be construed to have received mail subsidies during 1949 in their domestic service.

All three carriers operated at material deficits during 1948. A definite reversal was experienced in 1949 and gives promise of further profitable operations during 1950.

United Air Lines has the most thorough descriptive and detailed annual account of all the carriers reporting thus far. Financial and operating data are revealed covering every significant phase of the company's activities for 1949 with convenient comparisons for 1948. Summaries encompass a 24-year period in review and should delight any analyst or investor examining the financial and operating history of United.

▶**AA in Front**—American led the transcontinentals in terms of passenger revenues with $88,308,990 for 1949 compared with only $76,861,942 for 1948. Total revenues from all sources came to $103,205,873, up some 15 percent over the 1948 total. After all operating charges and deductions, net income for 1949 amounted to $6,511,237 or 78 cents per common share after payment of $1,400,000 in dividends, as required, on the preferred stock.

American provided $1,800,000 for 1949 federal income taxes. A "carry-forward" tax credit of $950,000 was available last year and served to reduce the tax impost accordingly. No similar tax credit is available for 1950.

American is reflecting by a direct credit to earned surplus, the partial reimbursement of costs due to the grounding of the DC6s during the latter part of 1947 and early 1948. Such credits, however, are made only to the extent actually received.

The Civil Aeronautics Board, under a temporary order, is authorizing such payments on a monthly basis over a five-year period, retroactive to June 1, 1948. For 1949, American credited its earned surplus account with $633,333, representing such reimbursement. If this amount were taken directly into income for the year, as has been done by other carriers, American's 1949 net earnings would have been bolstered accordingly.

▶**Strongest Postwar Condition**—American's financial condition is the strongest it has ever been in the postwar period. Including $13 million earmarked for equipment purchases, net working capital amounted to $23.6 million as of the 1949 year-end compared with only $10.7 million a year earlier. The current improvement is after the purchase of $3,331,000 principal amount of its debentures during 1949. Additional debentures were purchased early in January, 1950, to make possible a total retirement of $4,050,000, representing sinking fund requirements of the years 1951 through 1953.

In commenting on proposed sale of American Overseas to Pan American, American notes this transaction, if and when consummated, may result in a loss of approximately $1 million on its original investment.

▶**TWA Up**—TWA reported a net profit of $3,708,845 in 1949, or $1.57 per common share, compared with an adjusted net loss of $1,277,591 for 1948. Of the 1949 earnings, $722,543 were accounted for by the domestic division and $2,986,302 by the international division.

Rates of mail compensation figure prominently in TWA's past and current earnings, and relate primarily to the company's international operations.

▶**Mail Pay Revision**—On Feb. 7, 1950, CAB issued a show-cause order proposing a reduction in the rate of mail compensation for the company's international division, retroactive to Jan. 1, 1949. This order, if final, would reduce mail revenue for last year by $1,800,000.

TWA is objecting to this proposed reduction, with a full rate hearing indicated and a final determination unlikely for some time. In the meantime, the Post Office Dept. is making payments only on the basis of the proposed reduced rates. Further, the Post Office is making additional deductions from current billings to recoup the alleged overprovements.

▶**Carry Forward Credits Used**—During 1949, TWA utilized carry-forward tax credits and was not subject to any federal taxes for the year. It is unclear from the annual report if additional tax credits will prevail during 1950.

TWA's financial position was strengthened considerably last year with further reduction of debt. Including $5 million advanced as deposits for purchase of equipment, net current assets amounted to $24,081,000 at Dec. 31, 1949. A year earlier, net working capital aggregated $9,209,000. Retroactive mail pay awards were an important factor, along with depreciation charges, in making this improvement in working capital possible. Moreover, long term debt was reduced by $6,751,000 last year.

While debt reductions will continue, new obligations will be incurred this year in connection with the acquisition of new equipment, thus creating an over-all increase in the debt structure.

▶**United's Showing**—United showed a net profit for 1949 of $2,249,405, equivalent to 88 cents a share on the outstanding common stock after preferred dividend requirements. This compared with 1948 net loss of $1,070,358.

Actually, the gain over 1948 was greater than indicated by net income figures. Air mail revenues averaged 63 cents a ton mile during 1949 compared with 91 cents for 1948. Further, income taxes were $1,919,109 last year, whereas during 1948 tax credits of $128,000 were received. Depreciation charges during 1949 were $12,308,698 as contrasted with $10,458,095 in the preceding year.

United's financial position was strengthened by continued debt reduction. From a total of $32,640,000, as of Dec. 31, 1948, long-term debt was reduced to $26,920,000 at the end of 1949. United's net working capital aggregated $12,283,279 as of the 1949 year-end. While UAL has commitments for the purchase of aircraft and other equipment in the amount of about $14.8 million, the company expects to meet these obligations from cash and securities on hand, funds from future operations and excess of depreciation over debt retirement needs. Depreciation and amortization came to more than $13.3 million during 1949, and can be seen as a sizeable source of cash retention.

The keynote for all three transcontinental carriers for 1950 was probably best expressed in the United report with the conclusion: "The difficult transition from the abnormal post-war years has been completed. With the abilities and opportunities which now are ours, we are moving to extend the gains already achieved."

—Selig Altschul

Special Problems...
Strict Requirements call for

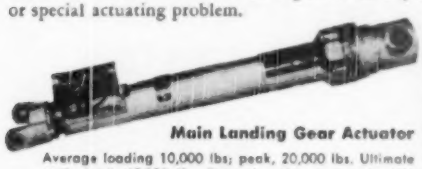
BREEZE
ACTUATORS & CONTROLS

the FAIRCHILD PACKET is an Outstanding Example

The U. S. Air Force wanted the C-119 Packet "workhorse" cargo plane to drop 20 500 lb. para-cans within 10 seconds. Fairchild solved the problem with an overhead monorail system operated by a Breeze rotary actuator.

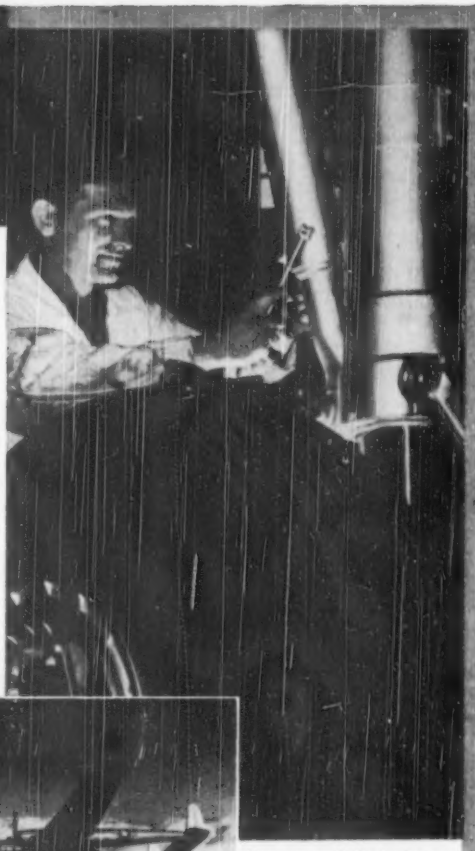
Using a 2-stage planetary gear train and friction disc clutch, together with a quick-stop and locking brake, this Breeze actuator operates 32.5 ft. of cable on a 9 in. diameter drum at 3,500 lb. pull. Total actuator weight is only 75 lbs.

Nose wheel and main landing gear of the Packet are also Breeze-actuated. Consult Breeze engineers on any standard or special actuating problem.



Main Landing Gear Actuator

Average loading 10,000 lbs; peak, 20,000 lbs. Ultimate static load, 45,000 lbs. Retraction time, approximately 7 seconds . . . total weight, including geared motor and hand-crank box, only 80 lbs.



Breeze screw-jack actuator retracts the gear in 7 seconds.

The Packet carries 42 paratroopers plus 10,000 lb. supplies with 2,000 mi. range.

Paratainer monorail actuator develops 1,300 lb. ft. torque from 24 volt D. C. motor.

ANOTHER BREEZE MARK PRODUCT

BREEZE
CORPORATIONS, INC.

41B South Sixth Street Newark, N. J.

Other Breeze Precision Products

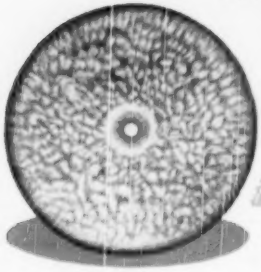
Special Connectors for advanced electronic equipment. Panel types, sealed types, etc., designed to requirements.

Radio Shielding: For any type of high or low tension system. New Type "unit leads" or re-wirable leads. Flexible shielded conduit.

"Aero-Seal" Worm-drive Hose Clamps. Vibration proof, uniform clamping, use again and again. Cadmium plated or stainless steel.

NOW No unbalanced operation—no swirls—just EXCEPTIONAL POLISHING

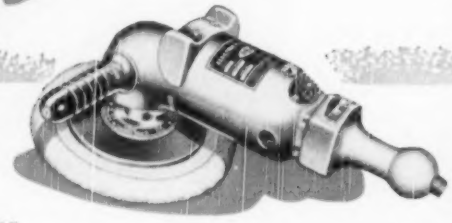
Speed . . ease . . reduced costs . . greater profits in polishing, rubbing and waxing with SIOUX POLISHING UNITS



SIOUX Polishing Pad No. 1211

Deep, thick, tough, long lasting wool nap. Strong canvas back. Hole in center for centering and clamping on holder—eliminates unbalanced operation and swirls—special feature. A wonder on patch work, blends new with old, completely hiding patch. Produces a superior finish on all polishing, rubbing or waxing.

No. 843 Wool Bonnet same as No. 1211 except bonnet type.



SIOUX Electric Polisher

No. 1200 gives correct speed—long life—dependable service. For easy and quick results get SIOUX.

Permanently lubricated—115 Volt A.C., D.C. Motor. Comes complete and ready to go to work.

SIOUX Auto Polish

For machine or hand polishing. Quickly cleans all surfaces and polishes in one operation. Restores original finish without injury to it or fine striping. Contains no injurious ingredients. Our own scientific formula—based on years of research.

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SALES & SERVICE

Cloud Seeding Pays Off Out West

California Electric Power's surplus Lockheed P-38 induces snow in Sierras using dry-ice method.

Good altitude performance of the Lockheed P-38 makes it a star performer for California Electric Power Co.—which uses a surplus Lightning to seed snow clouds, thus increase water supply for its five power houses in the High Sierras. Extra snow netted some 2.2 billion gal. over a 210-day seeding period, equivalent to 14,300,000 kwh.

It cost CEP about $200 per operational hour, including amortization, to use the P-38. Flights average approximately 1½ hr. Total costs ran to about $7500 for the operation, where steam generation of the same power would have cost $56,000. And Los Angeles also benefited through use of the extra drinking water after it had gone through the power houses.

▶ **Why the P-38**—Originally the company planned to use silver iodide for seeding. But this method works best when it is used below clouds. And clouds hang low over Bishop Valley, CEP's snow reservoir. So silver iodide was discarded because mountains made low flying dangerous.

The company switched to dry ice, dropped directly into the potential storm cloud. A plane with a ceiling of at least 30,000 ft. is needed to bombard clouds 15,000 ft. in depth hovering over a mountain crest averaging 13,000-ft. high. The BT-13 and AT-6 tried were unsatisfactory because of their ceiling limitations.

CEP settled on the P-38, which it says has operated satisfactorily in all weather conditions encountered. Pilot is Robert F. Symons, holder of four U. S. and world glider records and wartime flight commander of the U. S. glider training program at Wickenburg, Ariz.

More Farm Strips Sought for N. Y.

Need for more farm-site airports in New York was emphasized by Claude B. Friday, director of N. Y. State Bureau of Aviation at an address before a recent meeting of the state's Flying Farmers at Cornell University. He invited members to participate in a plan to double the number of landing facilities in the state (now 250 including 48 municipal fields), providing 250-300 additional airstrips in practically every sector.

▶ **Offers Aid**—Friday said the bureau would help in consultation and planning of the fields and advise on suitable locations, drainage, prevailing wind data, and rules and regulations affecting airport location. Bureau engineers estimate that the cost of converting a strip of farm land into an airstrip with good natural drainage and reasonable approaches would cost a few hundred dollars. This would cover clearing a 1500-2000-ft. sod strip and removal of ordinary approach obstacles such as high trees.

▶ **Air Markers**—It was reported there are now 404 air markers throughout the state, and at the end of this year there will be 530. State department of commerce will aid in a voluntary plan whereby it will approve locations and supply designs and paint.

Brazil Uses Copters For DDT Spraying

(McGraw-Hill World News)

Rio de Janeiro—The government's National Malaria Service plans to extend its DDT program into the Amazon valley this year.

Several helicopters, as well as ground squads, are to attack malaria in the states of Amazonas and Para and the territories of Amapa, Rio Branco, Acre and Guapore, all in the Amazon basin. About 180,000 homes and buildings are to receive direct applications of DDT.

NEW OMNI TESTER FOR SERVICE CENTERS

This new National Aeronautical Corp. (Narco) T-3 set is said to permit complete calibration tests on any omni equipment without removing the receiving device from the plane. The set generates all the signal components of an omni station. The omni track, which is transmitted, may be set on any bearing by means of an accurately calibrated dial. For bench overhauls, the test apparatus produces all the necessary signals to permit complete adjustments of phase localizer equipment and for tone localizer and VAR. Used with an oscilloscope, the T-3 traces an accurate visual and mathematical record of the signal during its path through the airborne omni equipment. Makers state T-3 cost is "extremely moderate."

BRIEFING FOR DEALERS AND DISTRIBUTORS

▶ **OUT OF BOUNDS**—A new definition of airplanes came to light in a recent Alaska Highway Commission announcement that it will arrest any pilot using the highway as a landing strip except in an emergency. The commission classifies planes as "illegal highway vehicles."

▶ **NEW MANAGEMENT** – Emarco Corp., Dayton, makers of a portable electric neon emergency flare, has been purchased by a Cleveland group. Albert F. Munhall is the new president and treasurer; Ambrose E. Koch, vp; Harold A. Kline, vp and chief engineer; and Karl J. Ertle is secretary. Vern E. Messner is also associated in the new ownership. Mr. Munhall will handle general management, marketing, and distribution of all products.

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PERFORMANCE

Every major airline relies on Bendix Radio communication and navigation equipment—a preference based on sterling performance under every conceivable flight condition in all parts of the world.

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Buying job-designed Bendix Radio allows you to choose for yourself, from a single reliable source, any type of installation, or any combination of equipment—because Bendix Radio builds a complete line of aviation radios.

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If you are in the market for any type of aircraft communication equipment, take just a moment to look at Bendix Radio's remarkable record in this field. When you analyze it, perhaps the most important thing is not the fact that Bendix Radio is *the* leader, but that Bendix Radio has *maintained* this leadership through the years with pace-setting improvements and developments—V.H.F. Omni-directional Range Navigation Systems, Radar, G.C.A. and many others were pioneered and perfected by Bendix Radio. This *background* of *leadership* could only have been achieved—as it was—by an engineering staff and production facilities second to none. So, when you buy aircraft radio equipment, choose the source of *proven* quality—Bendix Radio.

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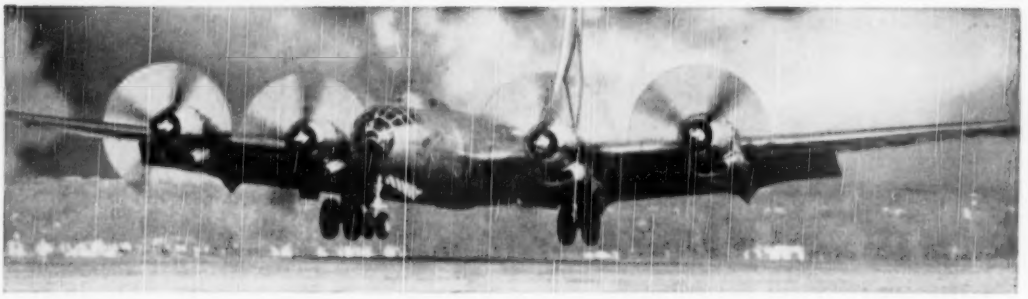


For the toughest glazing jobs

Safety Glass BY PITTSBURGH

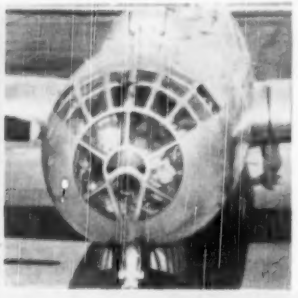
NEW requirements . . . for more adaptable transparent materials . . . for more advanced glazing methods . . . are a constant factor in aircraft production. Meeting those requirements—with new or improved products and new or improved techniques—is a constant factor in Pittsburgh's continuing aggressive development program.

On many types of military and large commercial planes you will find aircraft type Safety Glasses, transparent plastics, photographic glasses, precision bullet-resisting glasses and double-glazed Safety Glass, all developed by Pittsburgh.

In pilots' cockpits and bombers' compartments, new and different methods of joining multiple curved panels to each other and to the fuselage in a smooth flush mounting help aircraft designers to approach the aerodynamic ideal and also impart to the entire assembly rigidity and strength that more than meet the structural requirements.

Our unequalled equipment and constant research—plus the "know how" of men who have devoted their lives to making quality glass—are at the disposal of all plane manufacturers, large and small.

When you are concerned with Safety Glass and glazing methods for airplanes, bring your problem to Pittsburgh. Pittsburgh Plate Glass Company, 2094-0 Grant Building, Pittsburgh 19, Pennsylvania.



The pilot's cockpit of the B-50 "Lucky Lady II" (above the circular nose) is glazed with Pittsburgh Safety Glass. It withstands the pressurized load and wide temperature variations. Since the glass is optically "perfect" the pilot has undistorted vision through panels even at extremely acute angles.

In the pressurized cockpit of the XB-45, the flat and curved panels of the windshield embody an entirely new development in airplane glazing. Made of a special type of Flexseal (laminated safety glass and plastic) originated by Pittsburgh, they are free from optical distortion, comparatively light in weight.

One of the toughest glazing problems ever encountered was the windshield of the Shooting Star. It was solved by Pittsburgh specialists, with center panel of bird-resisting, bullet-resisting Pittsburgh Safety Plate Glass.

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

NEW AVIATION PRODUCTS

Automatic Cabin Pressure Control

New Kollsman system, adaptable to any pressurized plane, keeps fixed relation between outer and inner air.

A new aircraft cabin pressure control system that automatically maintains a fixed relationship between cabin altitude and airplane altitude is being shown to airplane engineers by Kollsman Instrument division of Square D Co.

The Elmhurst, N.Y., firm is stressing these advantages:

• **Completely automatic operation.** But manual controls are provided so the crew can meet unusual conditions.

• **Adaptability** to all types of aircraft of all performance ranges with only minor component changes.

• **Design that avoids** tobacco and other smoke tar problems. Pneumatic controls, potentiometers and sensitive electrical contacts used in present equipment have been replaced by an inductive electrical system which operates on 400 cycle ac current.

• **Lightweight,** compact and easily installed. Simplicity of components makes maintenance easy and low-cost. Initial cost also is moderate.

▶ **Prospects**—Two major airlines, according to Kollsman, already plan to check out the new system this summer in planes making regularly scheduled flights. While the system itself is new, its components—primarily pressure sensitive elements, synchros and motors—are standard Kollsman products which are "thoroughly proved . . . and . . . can be made available for an early installation."

As an additional plus, Kollsman can point out that the basic principle of the new system already is tested and proven. For it is similar to that now used in the DC-6. But the DC-6 equipment, also a Kollsman development, is "much more complicated and requires more pilot control," according to Jack Andresen, chief electromechanical engineer at Kollsman. And the DC-6 unit is not specifically designed for easy installation in other craft.

▶ **Weight**—Total weight of the equipment is less than 20 lb. for a version consisting of three main units, a Command amplifier incorporating major components of the system, a cabin altitude selector (manual control), and a valve-motor unit.

This is in line with the weight of other types of cabin pressure control systems, Andresen says. But, he adds, the new system promises to more than cancel out its own weight by cutting down on the amount of metal ducting now required.

Important features of the equipment are three Synchrotel instruments, developed by Kollsman, which measure respectively the cabin absolute pressure, the outside altitude pressure and the pressure difference between them.

▶ **Design Premise**—This cabin pressure control is based on the premise that there should be a fixed relationship between altitude at which the plane is flying and the pressure maintained in the cabin. Terms of this relationship are:

• **Cabin pressure will decrease** uniformly with increase in altitude.

• **Sea level pressure** of 29.92 in. Hg

• **A differential pressure,** depending on the structural characteristics of the aircraft, will exist between the cabin and the outside air when the plane is flying at its best pressure altitude.

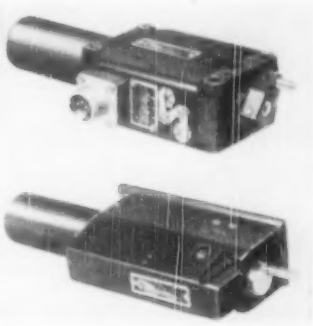
▶ **Also Adjustable**—In normal operation of the system, the rate of change of the pressure in the cabin is limited to some value, such as the equivalent of 300 fpm., at sea level, or about 0.3 in. Hg/min. As an optional feature, this rate can be made adjustable, and set by the pilot or on the ground.

When conditions demand it, cabin pressure can be equalized to outside pressure. The change in pressure required to equalize is subject to the rate limitations described above. This operation is controlled by the cabin selector in the cockpit and by a switch on the landing gear oleo.

▶ **Differential Control**—The entire system is subject to a maximum differential pressure control which opens an air outflow valve whenever the safe maximum differential pressure between the inside of the airplane and the outside air is reached.

This differential pressure override is not subject to the rate of pressure change limitation. It is, however, a proportional control due to the nature of the signal from a differential pressure transmitter.

If the pilot desires, he also can switch the cabin altitude selector from "automatic" to an arbitrary cabin altitude setting. This setting is independent of the altitude at which the plane is flying, but still is subject to rate-of-change and differential pressure limitations.



Trim Tab Control

Improved "Trim Trol" rotary actuator, offered by Airborne Accessories Corp., 25 Montgomery St., Hillside 5, N. J., has been redesigned into more compact unit weighing 2¼ lb.

Designed to control trim tabs in "latest aircraft," unit can be installed in wing and connected to tab through simple link. It produces 350 in. lb. operating torque through 180 deg. maximum rotation and conforms to all applicable specifications, AN M-40, AAF 41251 and TN-TSESE-1. Static capacity exceeds 1500 in. lb.

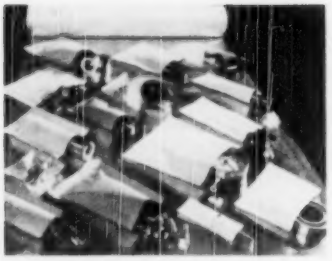
Actuator incorporates zero backlash output, magnetic brake, limit-in externally adjustable limit switches, 26v. dc explosion-proof reversible motor, position transmitter—3000 ohm potentiometer (externally adjustable), and built-in radio noise filter. Units are available for controlling these actuators with a potentiometer to permit "dialing" the setting without overshoot and to eliminate need of providing a position indicator.

Actuator comes in two models, OR-420 (top) and OR-422 (bottom), having identical performance, but featuring different mounting arrangements to meet varying installation requirements. Dimensions of both units excluding output shafts and electric receptacle on OR-420 are 6.5 x 1.8 in.

Portable Step

Lightweight, Rol-Away portable step unit for use with passenger planes or in shop work is offered by the **Honeyman Mfg. Co.**, Portland, Ore.

Constructed of aluminum-alloy tubing and angle steel, unit has rubber wheels enabling it to be easily rolled into position. Rubber feet on front legs are said to give rigid stability and safety when stand is set in place.

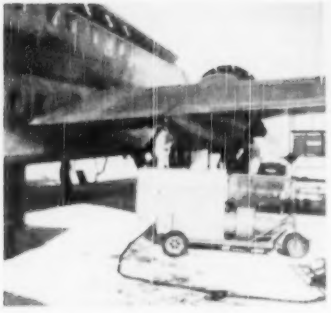


Bags Protect Parts

Plastic-laminated and moisture-proof bags, designed to protect parts with machined surfaces, tools, delicate instruments, controls, and similar items while in storage or in transit, have been developed by the **Munson Bag Co.**, 1345 W. 117 St., Cleveland, Ohio.

They are available in wide range of sizes and in different combinations with printed trade marks, serial numbers, parts numbers, shipping instructions, order numbers, etc., to meet individual requirements.

Bags are fabricated in polyethylene only, polyethylene laminated to foil or kraft, and polyethylene laminated to cloth-backed foil. They reportedly will not support the growth of mold, are non-toxic, and are not affected by ultra-violet light, changes in humidity, salt water, active solvents and dilute or concentrated acids such as sulphuric, hydrochloric and nitric. Bags stay flexible down to temperatures of −40 C, according to maker.



Heats Large Planes

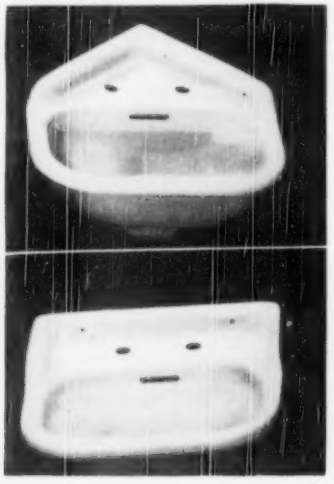
A new ground heater designed for use with all existing transport planes, is being marketed by the **Herman Nelson division, American Air Filter Co., Inc.**, Moline, Ill.

Called the CT-1000, the unit supplies cabin heat to the largest type transports to insure passenger comfort while awaiting takeoff. It also is used for engine preheating and is said to have numerous other applications around air terminals and maintenance facilities.

The maker reports Northwest Airlines is first purchaser of the new heaters. This carrier will use them in its Boeing Stratocruiser operations.

Heater is fully automatic and has capacity of 250,000 btu./hr. at temperature rise of 160 F. It delivers 2000 cu. ft./min. of air at 6 in. water gauge static pressure. Unit normally burns aviation gasoline but can be adjusted to take kerosene or light fuel oil. It is powered by 28½v. electric motor, weighs 800 lb., and is mounted on three-wheel, rubber-tired trailer to facilitate one-man handling.

Warm air is transmitted by high-speed, centrifugal blower through canvas ducts to aircraft. Nelson reports it now is developing evaporative cooler which can be attached to CT-1000 to keep passengers comfortable during hot weather.



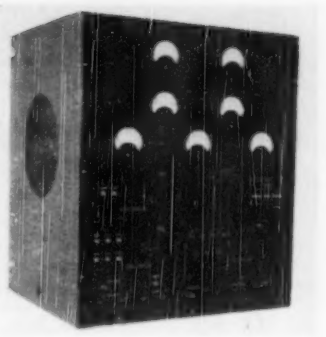
Wash Basins Aloft

Lightweight plastic wash basins for transport aircraft are offered by **Durable Formed Product Inc.**, 329 Canal St., New York, N. Y.

Made of thick, shatter-resistant Lucite or Plexiglas, units are represented not to chip, rust or stain, and are guaranteed to withstand boiling water without damage.

Wall type basin, No. 701 (bottom) weighs 2 lb., and measures 14¼ x 12¼ x 5 in. No. 501 vanity insert type (not shown) weighs 5 lb., measures 17 x 11 x 6 in. Dimensions of corner basin (top) No. 401, are 14½ x 15 x 5 in., while weight comes to 2 lb. Specially lightweight model, not shown, is No. 300 which weighs 1¼ lb. and is 11 in. long, 14 in. wide and 5 in. deep.

Basins are available in these colors; pastel pink, green, blue and standard white.

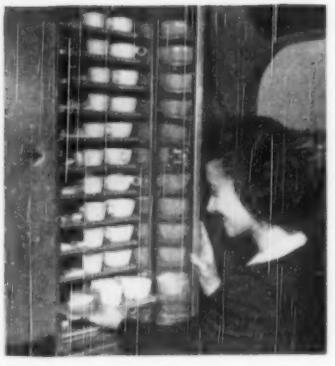


Checks Inverters

For testing high capacity aircraft inverters, **Greer Hydraulics, Inc.**, 454 18th St., Brooklyn, N. Y., has developed Model AI-1 inverter test stand.

Unit has full instrumentation and makes it possible to run complete pre-installation and after-overhaul-checks on latest type inverters.

It provides balanced 3-phase loading from 0-3000va. at 125v., 400c.; single-phase loading from 0-2000va. at 125v., 400c.; single-phase loading from 0-250va. at 26v., 400c. Tester also provides automatic overload protection, interlocking d.c. supply and cooling fan circuits, and automatic overheating protection for test stand itself.

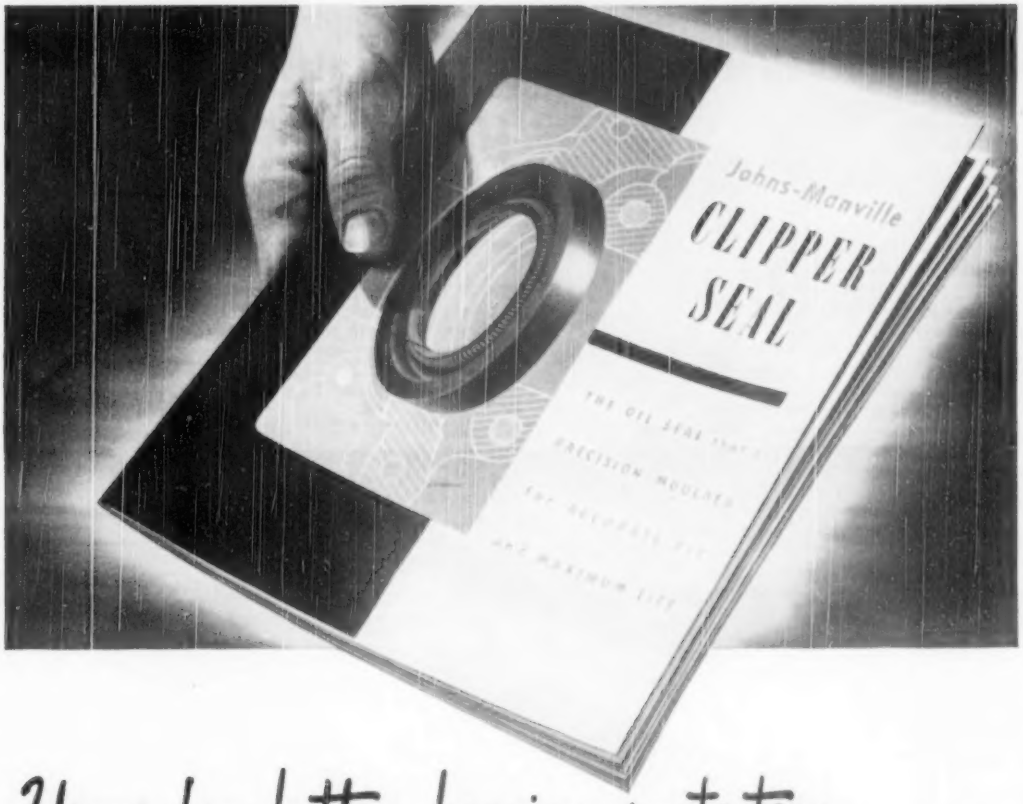


Preserves Food

New-style cold food storage cabinet for DC-6 aircraft has been placed on market by **Texas Engineering and Mfg. Co.**, Dallas, Texas.

Cabinet is made of aluminum alloy and features herringbone pattern on door. It is completely sealed and insulated throughout with Fiberglas. Unit carries 12 trays and weighs 28 lb. It is 13 in. wide, 18 in. deep and 38 in. high.

TEMCO reports an initial order for 200 of the new food lockers already has been placed by American Airlines, which set up original design specs.



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Here you will find many photographs and diagrams of typical Clipper Seal installations; complete information on the various lip designs that provide a choice of bearing surfaces; the wide range of sizes that are available; the thick or thin flanges that increase design freedom and permit important economies in machining tolerances.

Here are Clipper Seals that overcome the problems of electrolysis and corrosion; that can be used for dry sealing . . . for weather-proof bearing protection . . . seals designed for high temperatures and speeds . . . and for many other special conditions.

If you are a design or drafting engineer, or are concerned with aircraft and engine maintenance and overhaul, don't miss sending for your copy of this new book on Clipper Seals and their uses. It's full of practical information that can help you get better bearing protection at lower cost. Write today or fill in the coupon below.

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combustion engineering—in action—for air progress

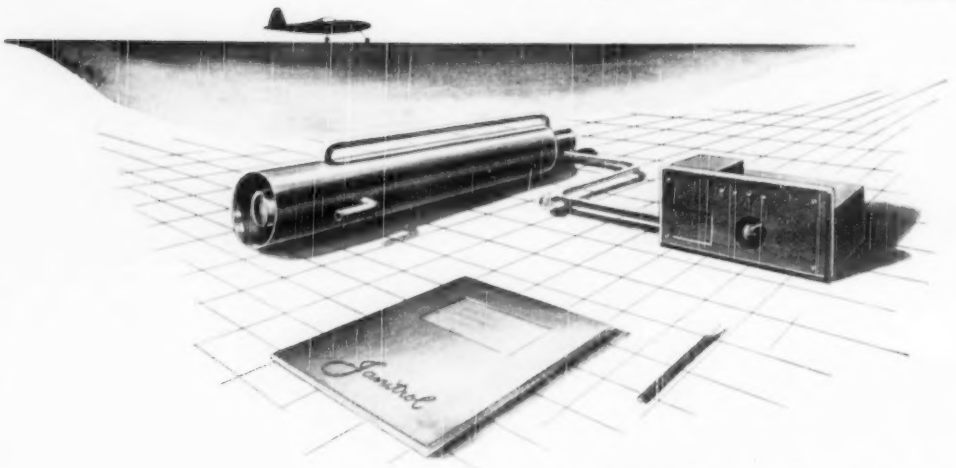
how to keep a gas tank from getting any HOT IDEAS

Gasoline—like any other combustible material—demands oxygen when it burns. So it has long seemed like a good idea to keep oxygen out of aircraft fuel tanks and thus keep gasoline a friend and not a potential enemy.

Good theory, but how to apply it has stumped a good many experts.

Now, from our laboratories, comes a preliminary answer: a tiny combustion-type heater to furnish "purge gas" (oxygen-free gas) to fuel tanks—and then, of all things, to throw the heat away!

A lot of Surface Combustion's hard-earned how-to-do-it experience went into this generator design: how to insure proper ignition, how



to maintain a constant fuel-air ratio at all altitudes, how to keep the "purge gas" dry and free of oxygen, how to insure safety under all conditions—and how to do all this in a "fly-weight" compact system.

Many of these problems were not new to Surface Combustion engineers—many already solved in the development of aircraft heating equipment that has served well the world over. Thus we feel sure this development will do everything expected of it, and make an important contribution to aviation progress.

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FLIGHT	AIR MILEAGE (AIRPORT TO AIRPORT MILES)	FLIGHT SCHEDULE TIME	BLOCK TO BLOCK SPEED, MPH	GROUND TRANSPORTATION MILEAGE	GROUND TIME	AVERAGE GROUND SPEED, MPH	TOTAL MILEAGE	AVERAGE OVERALL SPEED, MPH, AIRPLANE	HELICOPTER SPEED, MPH
BALTIMORE - WASHINGTON	40	22	109 MPH	11	75	8.8	51	32	76
CHICAGO - MILWAUKEE	82	35	141 MPH	16.5	25	11.7	98.5	50	78
NEW YORK - PHILADELPHIA	96	40	144 MPH	17	60	16.6	113	57	79
HARTFORD - NEW YORK	101	43	141 MPH	22.5	60	19.3	123.5	66	79
DETROIT - CLEVELAND	105	40	158 MPH	45	55	24	150	58	80
CHICAGO - INDIANAPOLIS	182	54	180 MPH	187.5	60	11.3	180.75	71	81.5

OVERALL SPEED of trip drops fast when ground speed is reckoned. Surface travel . . .

FLIGHT	AIR FARE	LIMOUSINE, BUS (INCLUDING TAX) OR CAB FARE	TOTAL COST	TOTAL MILEAGE (FROM TABLE)	OVERALL COST PER MILE TO PASSENGER
BALTIMORE - WASHINGTON	$2.88	$2.05	$4.93	51	$0.0966
CHICAGO - MILWAUKEE	$5.69	$2.00	$7.69	98.5	.077
NEW YORK - PHILADELPHIA	$6.73	$2.35	$9.08	113	.0805
HARTFORD - NEW YORK	$6.55	$2.25	$8.80	123.5	.0712
DETROIT - CLEVELAND	$7.48	$2.65	$10.13	150	.0675
CHICAGO - INDIANAPOLIS	$11.50	$2.40	$13.90	180.75	.0769

BOOSTS OVERALL COST by adding bus or taxi fare to usual plane fare.

'Slow' Helicopters Save Time

Eastern's chief engineer suggests rotorcraft be used for short-haul, inter-city transport operations.

A top airline engineer has challenged the long-held belief that an airplane is necessarily the fastest way to get from one city to another. On a point-to-point overall time basis, says Eastern Air Lines' Chief Engineer Charles Froesch, the airplane is not always the answer because the city-to-airport ride takes so long.

So he suggests that for short-haul inter-city air travel the transport helicopter is the faster and cheaper vehicle for air transport's "forgotten man" who spends nearly as much time in surface travel to and from airports as he does in the air.

Observers see two significant things in Froesch's analysis. The helicopter generally has been disregarded in inter-city transport air travel discussions because in comparison to an airplane it is a slow craft. And Froesch is the chief engineer of the airline that year in and year out has been the most profitable.

▶ **Trip Length**—The airplane gives unquestioned time advantages for trips of more than 300 miles. But even conventional feeder services are not the solution for the traveler who wants convenient and speedy air transportation on the 96-mi. run from New York to Philadelphia, the 105-mi. link from Detroit to Cleveland, or the 40-mi. flight from Baltimore to Washington.

Look at the charts above, prepared by Froesch to illustrate a paper delivered before the recent Fifth Annual Flight Propulsion Meeting of the Institute of the Aeronautical Sciences in Cleveland. They show that even improved express highways will cut the surface travel time problem only moderately.

▶ **Field for Expansion**—Civil Aeronautics Board Chairman Joseph J. O'Connell last month said it is reasonable to assume that within the next five to ten years a majority of passenger transportation in excess of 1000 miles will be by air. Other seasoned authorities think that air transportation right now has about reached its saturation point in the first-class, long-haul travel market.

Either way, it puts the real field for further air transportation expansion in the short-haul market. Froesch looks at it this way:

"There appears to be a growing recognition that if we are to continue to furnish true local and feeder air service, the airplane may not be most economical type of aircraft to use," he declared.

"With the advent of larger-size helicopters, and their increasingly reliable operation, (these ships) may eventually replace fixed-wing aircraft in our more densely populated areas because of their ability to land and take off closer to the traffic-generating areas."

▶ **Time and Cost**—Froesch said a study of the overall speed of air travel for distances of less than 200-300 miles reveals that it is sometimes slower than other means of surface travel, and substantially higher in cost. This is particularly true where the airports are located far from the cities they serve, either due to city size or terrain restrictions.

On a purely airport-to-airport basis, the helicopter is faster than conventional transports only for distances of less than 30 miles. However, Froesch pointed out that an overall speed analysis of typical airline flights between six sets of cities (using the best twin-engine performance today) shows an average overall speed of from 32 to 71 mph. for distances varying from 51 to about 181 miles.

As the chart shows, the airport-to-airport distance between New York and Philadelphia is 96 miles. Flight schedule time is around 40 minutes, and block-to-block speed is a respectable 144 mph.

▶ **Where Time Is Lost**—But the picture deteriorates when the 17 miles of ground transportation between city and airport at New York and Philadelphia is taken into consideration. Total ground time is 1 hr. 10 min., and the average rate of speed of the ground transportation is less than 15 mph.

Thus the entire 113-mi. trip from the center of New York to the center of Philadelphia by conventional airplane and surface transportation requires 1 hr. 50 min., and the overall speed is cut to only 57 mph. By contrast, Froesch estimates, a helicopter traveling from city center-to-city center could make the New York-Philadelphia flight at an average speed of 79 mph.

▶ **Fare, Plus**—You get the same deteriorating effect when you study the air traveler's total cost: Plane fare plus ground transportation charges. Froesch's chart shows this overall cost works out to between about 7 cents and 9½ cents per mile. Yet, the airline is getting only about 4½ to 6 cents, the difference going to ground transportation.

As Froesch puts it: "Besides being faster for distances up to approximately 180 miles, the helicopter permits an increase in revenue mileage which is at the present time given to ground transportation."

▶ **The Vehicle**—Here is the type of helicopter that the EAL engineer thinks could recapture this revenue for the airlines:

- **Capacity:** 25-30 passengers, 2000 lb. of mail and cargo.
- **Cruising speed:** 95-100 mph.
- **Weight and price:** 30,000-32,000 lb., assuming payload as 25 percent of gross weight; price would be in the neighborhood of $350,000.
- **Cost and fare:** $1.30 per mile operating cost on basis of 85 mph. ramp-to-ramp speed and 2500 hours per year utilization would bring fare down to about 4½ cents per seat mile, assuming no mail or cargo revenue and 100 percent load factor.

CAB Straddles on 500 kc. Issue

Board agrees that low-frequency emergency facilities are helpful, but doesn't say how they should be used.

Ability to utilize the 500 kc. maritime radio telegraph distress frequency probably will be made mandatory for U. S. airline transports flying a number of long, over-water routes.

The Civil Aeronautics Board has given grudging and highly-qualified endorsement to the low-frequency emergency facilities which the unions champion and the airlines consider almost worthless. But just how far CAB will go in implementing its decision on 500 kc. with new safety regulations is a lively topic of speculation.

The 500 kc. issue was dropped in the Board's lap last year after a CIO maritime committee and the Flight Radio Officers Assn. complained to Congress that the carriers were jeopardizing air safety by shifting from radio telegraph to radio telephone on a number of routes, including the West Coast-Hawaii link. The airlines replied that CAA had endorsed the shift and added that the unions apparently were trying to use featherbedding tactics which were designed to keep flight radio officers in their jobs.

▶ **Few in 50,000**—Airline officials claimed that in 50,000 commercial ocean crossings during the past 10 years there have been few instances of planes being ditched in the water where they would require aid from surface vessels. Besides, they declared, a plane in distress could talk to shore stations via radio telephone, and the message would be relayed to the ships at sea.

Even with two engines dead, a pilot will try to get his plane to the nearest land rather than try to ditch near a ship, the carriers observed. "If three or all four engines go out, or the plane otherwise becomes unairworthy, the crisis comes so suddenly that surface aid probably would be of little avail."

▶ **Help in Hurry**—Union officials replied that if a plane needs to contact a surface vessel the requirement usually is of the most urgent nature. Such a situation, they assert, requires direct plane-to-ship communications, not a time-consuming relay via shore stations.

In its decision on 500 kc., CAB said that in an emergency the most rapid and effective means of alerting the ground organization is through use of route frequency radio telephone. But it noted that a system of communications relay through the ground organization to ship stations involves "certain practical limitations which make it desirable to retain some provision for direct aircraft-ship radio under distress circumstances."

The 500 kc. frequency, CAB admitted, possesses technical limitations in its application to aircraft which render it less suitable than higher frequencies. The Board emphasized, however, that this radio telegraph frequency is the only presently available means to assure direct communications universally between aircraft and surface vessels.

▶ **No Operator Needed**—"Provisions other than the services of a fully-qualified flight radio officer may be made on board the plane to assure distress communications on 500 kc.," CAB continued. "A fully-qualified radio operator is not justified solely on the basis of a requirement for distress communications.

"Aircraft communicating equipment should be so designed and installed as to render it readily available for emergency communication on 500 kc. in the most effective manner practicable. The skill and knowledge requisite for use of 500 kc. under emergency circumstances should be possessed by those crew members who would, in time of emergency, be most available for such a function."

▶ **Partial Victory**—Members of the Flight Radio Officers Assn. saw the CAB decision as a step in the right direction. They pointed out that they had been losing the fight against the airlines' expanded use of radio telephone anyway, and that the Board's newest action at least gives them something tangible to hold on to.

Air Line Pilots Assn. supported FRO in the 500 kc. dispute. The pilots argued that however slim the chances of ditching, all available safeguards should be required.

Radio telephone has been used exclusively on U. S. domestic airlines for 20 years. But differences in language have made radio telegraph essential in some parts of the world.

Airline Crew Blamed In Lightplane Crash

Crew of a Capital Airlines DC-3 has been blamed for a mid-air collision in which the transport struck a Cessna 140, destroying the lightplane and killing the pilot.

The accident occurred last Aug. 7 near Maitland Lake Front Airport, Milwaukee. No one aboard the DC-3 was injured, although the craft was damaged substantially. A section of the DC-3's right wing, about 6 ft. inboard from the wing tip, and a portion of the right aileron were torn away.

▶ **Clear Weather**—A Civil Aeronautics Board report says the accident was probably caused by failure of the DC-3 pilots to see and avoid the Cessna. Weather was clear at the time, and visibility was 15 miles.

The DC-3 was descending in a shallow left turn while crossing Maitland Airport at an altitude of 1200-1500 ft. and at 160 mph. The Cessna was executing a climbing left turn and was ahead and to the right of the DC-3. Vision of the lightplane pilot was obstructed by his ship's left wing throughout the left turn which preceded the accident.

Pilot of the Cessna reportedly was conforming to the Maitland airport traffic pattern and was circling to gain altitude. CAB said that because it was Sunday afternoon, with more than average traffic in the Maitland area, the DC-3 pilots should have exercised the highest degree of alertness for other aircraft.

Air Guard is Fighting CAA Airport Ban

Air National Guardsmen are quietly marshalling state political forces to oppose possible CAA regulations banning military aircraft from municipal or privately owned airfields jointly used by civilian air components and commercial airlines.

Threat of CAA interference with militia air training, through banning military air traffic near commercial activity, is very real to the guardsmen. Feeling generally is that such a ban may be warranted at major population centers such as New York, Washington and Chicago, but should be left to dis-

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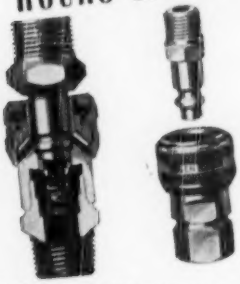

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cretion of local authorities where population is less than a million.

► **Wet Blanket**—Fear is that any CAA regulation would automatically blanket all airports used by the airlines. Such a ruling, ANG members insist, could strangle civilian component training. Claim is that it is becoming increasingly difficult to maintain a status-quo air strength because of inadequate airport facilities near nation's population centers which are prime sources of Air Guard pilot personnel.

Guard stand is that it is already difficult to hold businessmen flyers' interest in proficiency flight and ground training because of inaccessibility of present training bases to the trainee's personal base of operation. If CAA should ban military aircraft from all commercially used airports then ANG will be forced to more remote and poorer facilities. Direct effect upon ANG training and strength will be drastic.

Airport operators in less-populated areas are reported siding with the guardsmen because in most instances military rental affords a steady income to the none-too-financially-secure small airport operator.

Profits Up

TWA and Braniff latest to report 1949 gains. Jan. and Feb. look good.

The air transport industry is continuing to issue financial reports showing sharp gains in earnings over the same periods a year ago.

Latest carriers to report profits for 1949 are TWA and Braniff Airways. Preliminary airline results for January and February, 1950, give no indication of a traffic slump.

Estimated operating loss of the 16 domestic trunklines in January was $3,170,000—about $280,000 below the same 1949 month. Eastern, Delta, Inland, Mid-Continent and National were all in the black in January, 1950. Passenger traffic for the month for the 16 carriers was up 13 percent over January, 1949 (AVIATION WEEK, Mar. 27).

► **MCA in Black**—In February, Mid-Continent has reported an $8802 net profit, compared with a $5018 net loss for the same month last year. MCA said operating revenues were up 4.55 percent, with passenger and cargo traffic showing good gains.

TWA said traffic during the first two weeks of March was a record for the period. Domestic traffic, boosted by the American Airlines maintenance strike, was up 24 percent, and international traffic, helped by Holy Year business, soared nearly 33 percent.

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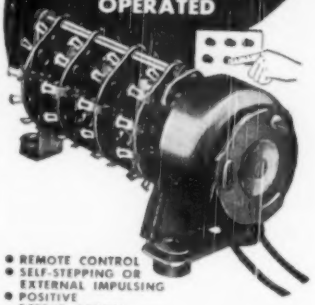

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United Air Lines has predicted first-quarter 1950 losses may be $500,000 below the deficit for the same period last year.

Of the larger carriers, Northwest Airlines appears to be heading for the worst losses in first-quarter 1950. The company's directors recently deferred action on a cumulative preference stock dividend.

▶ **Annual Reports**—Meanwhile, TWA reported a systemwide net profit of $3,709,000 in 1949, compared with an adjusted net loss of $1,278,000 in 1948 and a loss of $5,376,000 in 1947. Record gross revenues of $105,985,000 in 1949 compared with $101,050,000 the previous year. Passenger revenues jumped $5,867,000, while cargo receipts increased $493,000. At the same time air mail payments fell over $1.5 million despite an increase in mail volume handled.

President Ralph S. Damon said that of the $3,709,000 profit last year, $723,000 came from the domestic division and $2,986,000 from the international division. The international division profit may later be reduced by CAB mail pay action.

Braniff Airways reported a $221,595 profit in 1949 against a $191,634 profit in 1948. The company's domestic division earned $446,000 last year, but there was a $224,000 loss on Braniff's international routes.

Systemwide operating revenues of $18,438,000 were at a record high.

Wiggins Receives Year's Extension

E. W. Wiggins Airways, New England feederline, has received a year's extension of its certificate.

The Civil Aeronautics Board set Mar. 31, 1951, as the new expiration date for the carrier's operating authority. CAB's decision in the New England states case also gave Northeast Airlines permission to abandon service at Riverhead and Islip, Long Island, N. Y., but denied NEA permission to abandon service at New London, Conn.

▶ **Summer Service**—NEA's certificate was amended to permit the carrier to serve Bar Harbor, Me., and Laconia and Whitefield, N. H., between June 1 and Sept. 30 of each year. CAB denied all route applications of Putnam Airlines, Island Air Ferries and Massachusetts Airlines, which were included in the case.

The Board said its latest action "will not provide a long-range solution to all the problems of local air service in the New England area. It indicated that other proceedings now under way or yet to be instituted will help strengthen the route pattern in the region.

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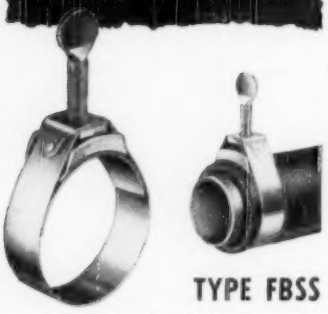

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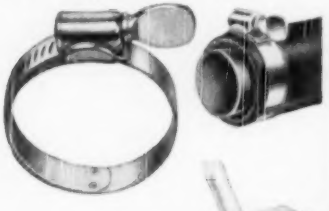

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Examiner Urges Southwest Renewal

Renewal of Southwest Airways Co.'s feeder certificate until Sept. 30, 1954, has been recommended by CAB Examiner Paul N. Pfeiffer.

The examiner also urged that United Air Lines' Route 1 certificate be suspended until Sept. 30, 1954, insofar as it now authorizes the trunk operator to serve Red Bluff, Monterey, Santa Barbara and Eureka-Arcata, Calif. These points are now served by both carriers, and CAB believes there may be uneconomic competition.

▶ **Merger Eyed**—UAL's service suspension at Eureka-Arcata should take effect only if CAB approves an interchange or merger agreement between Southwest and West Coast Airlines, Pfeiffer said.

Pfeiffer also recommended that United's service to Salinas, Calif., and Klamath Falls, Ore., should not be suspended and that Southwest's request to serve these points should be denied. He said CAB should institute an investigation to see whether SWA's service to Vallejo-Napa, Calif., should be suspended because of insufficient traffic.

The examiner rejected United's contention that CAB has no legal power to suspend a carrier's permanently certificated service to any point without the carrier's consent.

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▶ **Broad Protection**—Indemnity is provided for loss of life resulting from injury sustained while traveling in or on any air, land or water carrier licensed to transport passengers for hire, as well as U. S. or British military or naval air transport services.

Protection includes boarding or alighting from any public passenger or designated military plane; also against loss of life of the insured by exposure or disappearance following sinking or wrecking of any transport, except in Massachusetts, North Dakota, Oklahoma, and Virginia, where exposure and disappearance clauses are prohibited.

No limits are made on mileage traveled, number of trips made during the policy year, purpose of trips, kind of licensed public transportation used, or countries visited. However, injuries caused by war or act of war are not covered.

Continental Casualty says that policies can be obtained from any company agent without investigation, health questions or other red tape, and they are effective at 12:01 a.m. at the home of the insured on date of purchase. The client is protected the moment he leaves home, office or school on a journey.

Stratocruiser Record

Boeing Stratocruisers carried more than 160,000 revenue passengers on flights totaling more than 9 million airplane miles during the first 11 months of scheduled service, the Boeing Airplane Co. has announced on the basis of information received from Pan American, Northwest Airlines, BOAC, AOA and United Air Lines.

Stratocruiser service, which began April 1, 1949, with a PanAm inaugural flight from San Francisco to Honolulu, expanded during the year to include three airline routes across the Atlantic, three over the Pacific and one transcontinental route. They made more than 2200 ocean crossings and more than 500 transcontinental crossings.

Pan American Stratocruisers logged 1233 crossings of the Pacific during the

past year, carrying more than 42,000 passengers a total of more than 4 million plane miles.

The 55th Stratocruiser, last under existing contracts, was delivered March 24, 1950, to BOAC.

SHORTLINES

▶ **Air Line Dispatchers Assn.**—Reports a new agreement with Capital Airlines providing a wage scale of $270-$350 monthly for junior dispatchers and $375-$575 monthly for dispatchers. Pact with Pacific Northern Airlines gives assistant flight dispatchers $375-$475 monthly and flight dispatchers $500-$675 monthly at PNA's Anchorage base.

▶ **Air Line Stewards and Stewardesses Assn.**—Has renewed agreements with Braniff and Mid-Continent Airlines. Braniff pact gives 100 hostesses and pursers 4 percent pay increases with new scale ranging from $180 monthly to start to $255 during sixth year of service. MCA contract provides for the same wage increase and scale.

▶ **Braniff**—Company's net operating loss in the first two months of 1950 was $227,000 compared with a $360,000 deficit in the same period last year. March passenger load factors also represented an improvement over 1949. . . . Carrier hopes to extend its Latin American service to Buenos Aires this year. Braniff was certificated to Buenos Aires nearly four years ago but was unable to get an operating permit from the Argentine government.

▶ **BOAC**—Has announced the sale of 11 four-engine Plymouth flying boats to an American aircraft broker. The deal contained a provision that the buyer could not resell the planes without the consent of both BOAC and the U. S. State Department.

▶ **Calasia Air Transport**—CAB has granted the San Francisco company an exemption permitting reinstatement of its letter of registration as an irregular carrier. Calasia leases five C-54s from the Air Force.

▶ **Chicago & Southern**—A scheduled DC-3 flight from Kansas City to Memphis recently reached an average speed of 308 mph. on the 119-mile leg between Springfield, Mo., and Mammoth Springs, Ark. With the tail wind exceeding 125 mph. at times, the DC-3 made the entire 392-mile flight at an average speed of 247 mph.

▶ **Emery Air Freight Corp.**—Reports $25,934 net income in 1949 on gross revenues of $1,105,118; compared with net loss of $18,124 on gross revenues of $709,308 in 1948.

▶ **KLM**—Has received a permanent CAA license to repair and overhaul U. S. air-

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craft, including Stratocruisers, at its Schiphol (Amsterdam) Airport shops. Hitherto, a separate CAA permit was required for each job done at Schiphol.

▶ **Northeast**—Reports $24,364 net profit in 1949 on $5,793,502 operating revenues, compared with $160,250 net loss on $5,015,339 operating revenues in 1948.

▶ **Northwest**—Company's request for an exemption to serve Taipeh, Formosa, as an intermediate point on its Pacific route has been denied by CAB.

▶ **TWA**—Expects to inaugurate $110 transcontinental Constellation coach service Apr. 30. The three 81-seat craft to be used on the New York-Chicago-Los Angeles run are to make the westbound flight in 11 hr., 5 min., and the eastbound trip in 10 hr., 25 min.

▶ **United**—President W. A. Patterson believes that adaptability of UAL's DC-6s to turboprops probably will limit the company's new equipment purchases to power plants for several years. United hopes to test a turboprop DC-6 on cargo flights "within a year."

▶ **Western**—Plans to inaugurate through Convair service from Salt Lake City to Edmonton, Alberta, Canada, on Apr. 30.

▶ **Youngstown Airways**—Has asked CAB for a certificate to operate scheduled service between Youngstown, O., and Columbus.

CAB SCHEDULE

Apr. 17—Prehearing conference on Lehman Brothers interlocking relationship case. (Docket 3605)

Apr. 17—Hearing on CAB's enforcement action against Arrow Airways. (Docket 4199)

Apr. 17—Hearing on CAB's enforcement action against National Travel Club, Inc. (Docket 4194)

Apr. 17—Oral argument on service to Springfield, Mass., case. (Docket 3748 et al)

Apr. 17—Hearing on enforcement action against Trans American Airways, Great Lakes Airlines, Golden Airways, Edward Ware Tabor and Sky Coach Airtravel, Inc. (Docket 4161)

Apr. 18—Prehearing conference on CAB's investigation of unauthorized operations by Metropolitan Air Freight Depot, Inc. (Docket 4319)

Apr. 19—Prehearing conference on CAB's investigation of unauthorized operations by American Shippers, Inc. (Docket 4296)

Apr. 20—Prehearing conference on Caribbean Atlantic Airlines' mail rate. (Docket 2210)

May 1—Hearing on CAB's enforcement action against Peninsular Air Transport, Associated Airlines Agency and National Air Coach Systems. (Docket 4084)

May 8—Hearing on case involving American Airlines' Los Angeles-San Francisco cargo flights. (Docket 4211)

May 15—Hearing on CAB's investigation of New York-Miami daylight coach service. (Docket 4302)

June 12—Hearing on applications of TWA and American Overseas Airlines to suspend service at Philadelphia on trans-Atlantic flights. (Docket 4228)

June 19—Hearing on CAB investigation of Northwest Airlines' tariff practices and uncertificated operations of Fly Freight, Inc., and Sterling Freightways. (Docket 4290)

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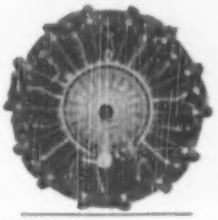

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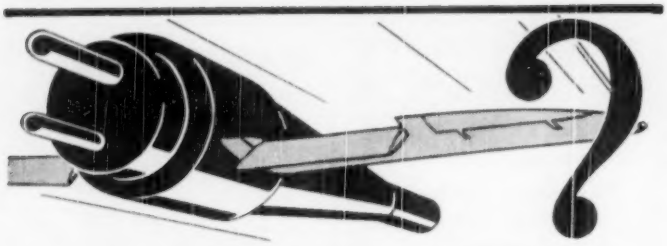

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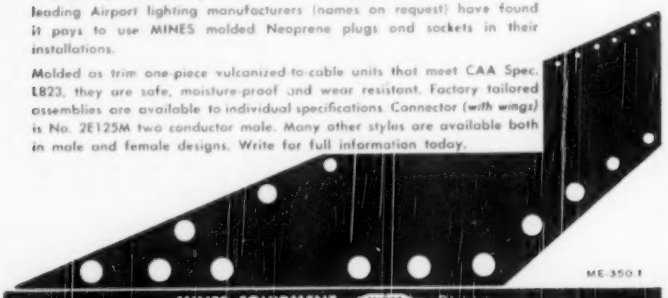

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Bendix Radio Div. of Bendix Aviation Corp. 40, 41
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B. G. Corporation ..... Front Cover
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Breeze Corporations, Inc. 37
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Sinclair Refining Company 30, 31
Agency—Morey, Humm & Johnstone, Inc.
Southwest Airmotive Company 35
Agency—Wilhelm-Laughlin-Wilson & Associates
Sperry Gyroscope Company ..... Third Cover
Agency—Charles Dallas Reach Co., Inc.
Standard Oil Co. of Indiana ..... Second Cover
Agency—McCann-Erickson, Inc.
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Truman, Finletter, and Air Power

President Truman's nomination of Thomas Knight Finletter as Secretary of the Air Force is a good omen. So is Mr. Finletter's acceptance. Both appear to indicate air power is rising in Washington's political barometer.

Mr. Truman must know well by this time that he has made a botch of rebuilding and modernizing air power and that Gen. Eisenhower's strong plea on Capitol Hill the other day for a better Air Force is more than the measured words of an eminently respected military man. It is also a clue to the temper of public opinion, and a catalytic agent to set opinion working to express itself.

Mr. Truman knows that Mr. Finletter took some "selling" before he would consent to succeed to Mr. Symington's vacated chair in the Pentagon. And he must know Mr. Finletter is not the kind of man who backs down on his own principles so carefully formed.

Mr. Finletter headed what has been described many times—both in and outside aviation—as one of the most distinguished groups of aviation fact-finders in history. This group's final report, titled "Survival in the Air Age," made careful recommendations for the kind of air protection the nation needed. Mr. Truman created the committee and selected Mr. Finletter to run it. The report was hailed by everyone except Mr. Truman. Up to now he has ignored it.

Finally, however, Mr. Finletter's selection seems to indicate we are making progress. It is high time. Steady deterioration of U. S.-Russian relations, steady expansion of Russian influence and the Russian atomic bomb, make "Survival in the Air Age" a far more critical problem now than in January, 1948, when the report was presented to the President.

It now appears that when the House of Representatives returns Apr. 18 from its Easter recess it will be called upon to make still another decision affecting our possibilities of surviving in the air age. Shall we keep on "economizing" at the expense of U. S. air power muscle and sinew, or shall we put up funds to support even a 48-group Air Force and an adequate Air Navy?

Mr. Truman must know the temper of Congress. And of the people. Maybe he is repeating history. When he announced in 1947 that he was appointing a special fact-finding committee to advise him on the best possible postwar air protection, he was deliberately snatching the initiative from Congress, where just such a committee was being promoted. Such a group was formed, and made its report, but the President's commission took the spotlight, did a better job, reported first, and got most of the publicity.

Now, with nomination of Mr. Finletter, it appears Mr. Truman again is grabbing the initiative.

A key to the Administration's procedure may be provided by the Joint Chiefs of Staff in recommendations which Secretary Johnson has virtually committed himself to accept. Since both Air Force and Navy leaders have already testified to Congress that the present procurement is inadequate even to preserve a modern Air Force and Air Navy in status quo, it seems logical that the Joint Chiefs will make the same recommendation, for additional funds. However, it appears at the Pentagon now that the JCS decision may not be announced until late April or early May.

On Capitol Hill there has been introduced an amendment offered by Rep. Carl Vinson, chairman of the influential House Military Affairs Committee, calling for $583 million additional for aviation procurement. This would make $200 million more available for USAF, now held to $1350 million, and $383 million more would go to the Navy for aviation, currently held to $633 million in the fiscal 1951 budget.

Analysis of the 1951 level, without Vinson's additions, as presented by Air Force and Navy before Congress, shows a steady decline in modern air power:

• USAF—At a continuing level of $1350 million a year, the Air Force would deteriorate to an estimated 38-42 groups of modern planes by 1954-56. If the even lower $1.2-billion procurement level of 1950 were continued, USAF would have 34 modern groups by 1955-56.

• Navy Air—If the $633-million level continues, which is slated to buy 817 planes in 1951, the current operating strength of 6233 planes (4389 regular and 1844 reserve) would shrink to about 3000 planes in 10 years.

Obviously, USAF and Navy want the Vinson amendment if Truman and Johnson will let them have it, because Vinson's additional program is based on Joint Chiefs of Staff basic planning.

Indication now is that primary emphasis in the procurement that would be made possible by the Vinson amendment would be for tactical support and transport aircraft for the USAF, and for shipboard fighter-bomber types for the Navy, all aimed at meeting deficiencies in tactical air support planes.

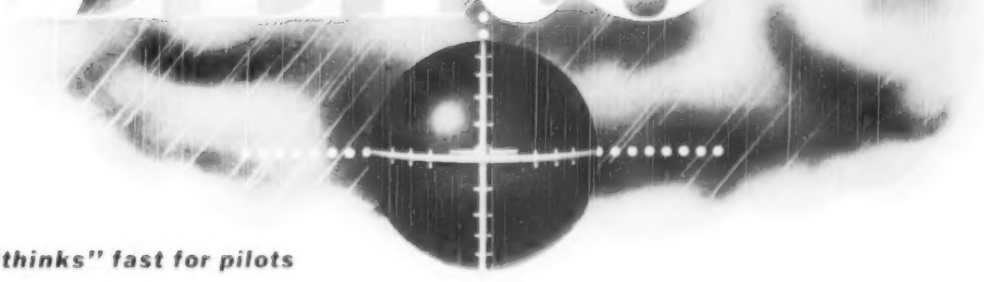
Vinson's amendment is not designed to step up procurement toward the 70-group level again. Apparently air power realists have dropped that figure, however desirable, as probably unattainable in the present Administration. All that is proposed to do with the $583-million addition is to prevent further shrinkage.

Some Washington sources see a possibility that more money could be made available almost immediately for procurement, if President Truman would unhand enough from that 1950 fund of $851 million he impounded so that he could get the program underway before Congress could take action.

This move would recapture the initiative for the Executive Department. And the money which was scheduled for 1951 fiscal year spending could be replaced for the 1951 budget by passage of the Vinson amendment in due course.

So it looks now to the staff of AVIATION WEEK as though chances are better in Washington than they have looked for many months for sufficient added money to preserve the minimum 48-group Air Force and Naval air power in modern status quo. —Robert H. Wood

ZERO reader



"thinks" fast for pilots

Sperry's new simplified gyroscopic indicator the ZERO READER* is a *fast thinking calculator*. It continuously pieces together attitude, altitude, heading and radio path information and relieves the pilot of complex mental calculations on approaches and landings... simplifies en route flying procedures, leaving more time to devote to other problems vital to the success of his flight plan.

Sperry introduced the Gyro-Horizon, Directional Gyro, Gyrosyn Compass and Gyropilot. Now Sperry introduces the ZERO READER which is the only manual system approaching the performance of stabilized automatic flight control, another progressive step toward the development of all-weather operations.

Developed by Sperry with the cooperation and encouragement of All-Weather Flying Division, USAF and the Air Transport Association, the ZERO READER is an example of Sperry's never-ending search for new and better ways to improve flying techniques.

*Trademark of Sperry

GYROSCOPE COMPANY

DIVISION OF THE SPERRY CORPORATION
GREAT NECK, NEW YORK

NEW YORK • CLEVELAND • NEW ORLEANS
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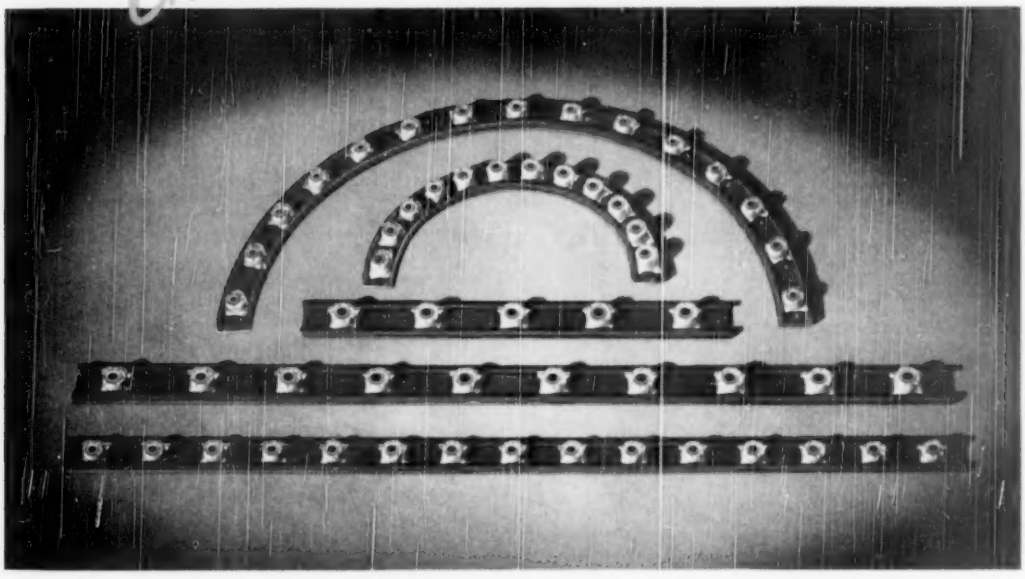
NEW!

Esna Gang Channel Strip

PROVIDES PERMANENT FASTENERS FOR APPLICATIONS SUBJECTED TO REPEATED "ON-OFF" USAGE



—New High Strength 24S-T1 Aluminum Alloy Channel Strip—Colored Blue for Easy Identification!

During production, mis-alignment of sub-assembly components can result in twisted channel strips—or nuts pushed out. This is particularly true in such applications as access covers and panels. Therefore, to promote additional production line economy and to further simplify time-saving multi-unit nut installations, ESNA developed their new 24S-T1 gang channel strips.

The extra tough aluminum alloy used for this new product provides additional strength for these unusual assemblies . . . and a new method of cut and raised dimpling retains the nuts securely, and prevents over-riding.

In addition, the new ESNA gang channel features a Nylon Locking Insert that assures *reusability for over 100 applications.* This means tremendous savings in maintenance costs. Why? Because access covers, panels and similar components are regularly detached to permit inspection or repairs. Formerly, nut strips used on these assemblies had to be replaced, because of the high re-use factor. Now, however, the new ESNA Gang Channel Nuts, with the nylon red elastic locking collar, guarantee long range maintenance economy—*the self-locking torque is assured for the life of the aircraft.* And like all Elastic Stop Nuts, they protect fastenings against vibration . . . impact . . . and shock! The famous nylon red elastic collar keeps bolt and nut threads rust-free, seals against liquid seepage . . . and is REUSEABLE . . . OVER ONE HUNDRED TIMES!

HERE'S A CHALLENGE: Send us complete details of your toughest bolted trouble-spot whether it involves a gang channel nut application or another type of Elastic Stop Nut. We'll supply test nuts—FREE, in experimental quantities. Or for data sheets on the new ESNA Gang Channel—Write: Elastic Stop Nut Corporation of America, Union, N. J. Representatives and Agents are located in Milwaukee; New York City; Cleveland; Indianapolis; Boston; Detroit; Chicago; Pittsburgh; Houston; Bradenton, Florida; Beverly Hills, Calif.; Montreal, Canada.

ESNA

ELASTIC STOP NUTS

HIGH TENSILE · ANCHOR · HIGH TEMPERATURE · SPLINE · CLINCH · GANG CHANNEL · NYLON CAP

OVER 150 TYPES AND SIZES IMMEDIATELY AVAILABLE FROM STOCK